



Service Manual for Syringe Pump ARGUS 600 S

Made in Switzerland



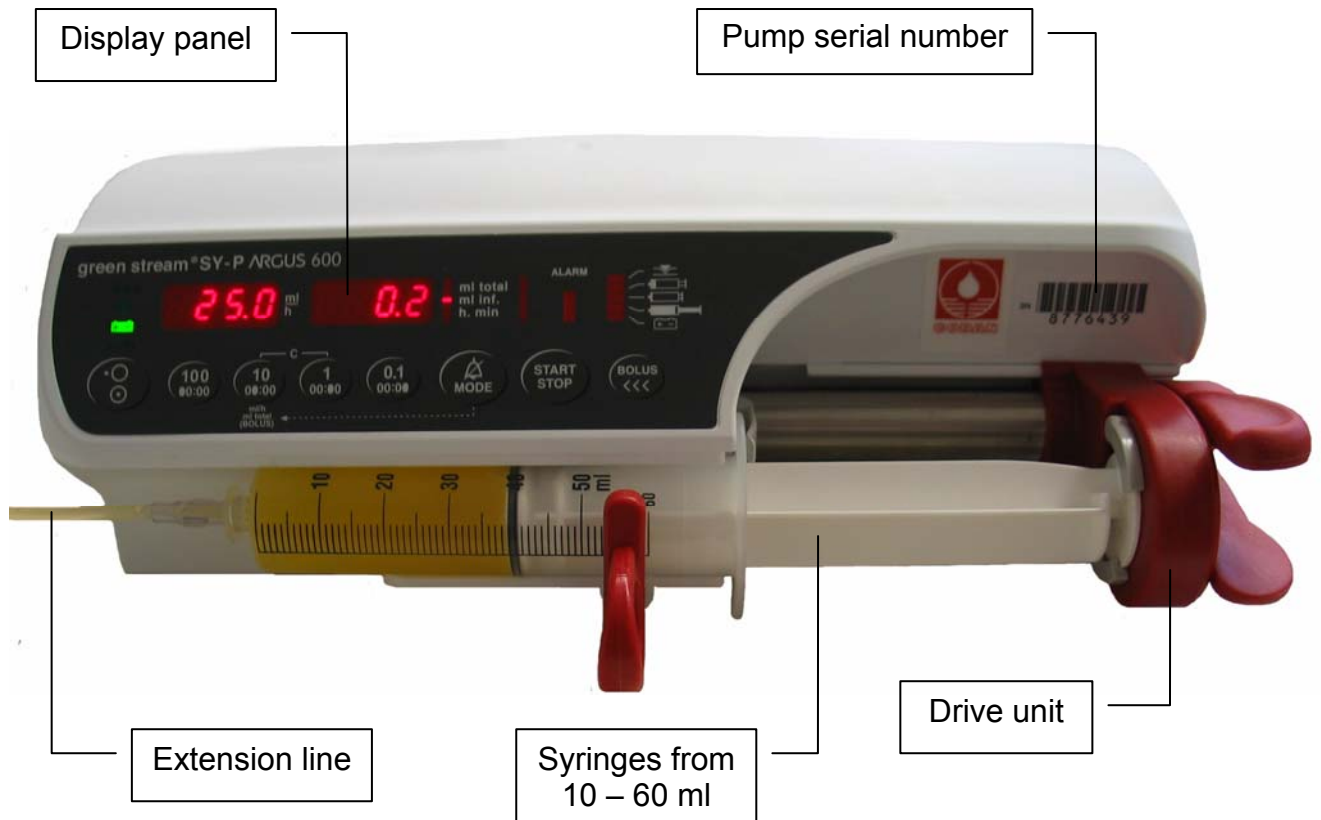
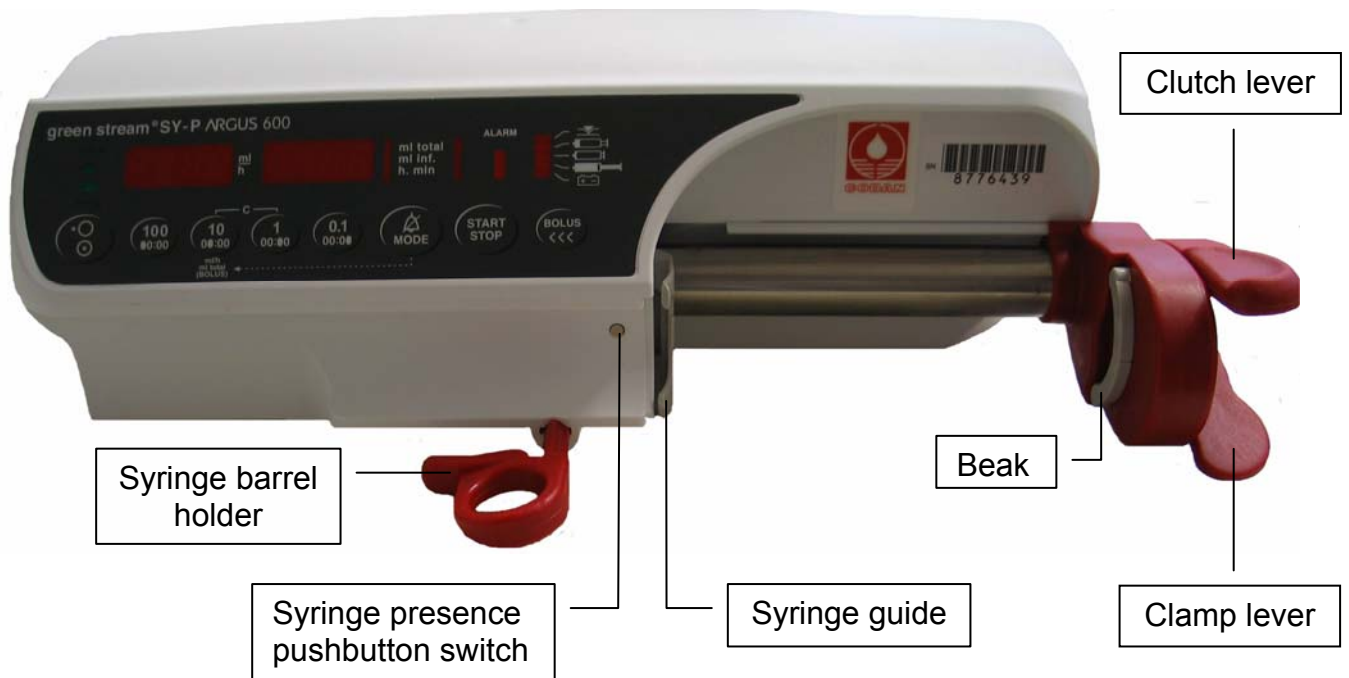
ARGUS Medical AG, CH-3627 Heimberg / Switzerland
(a member of the CODAN group)

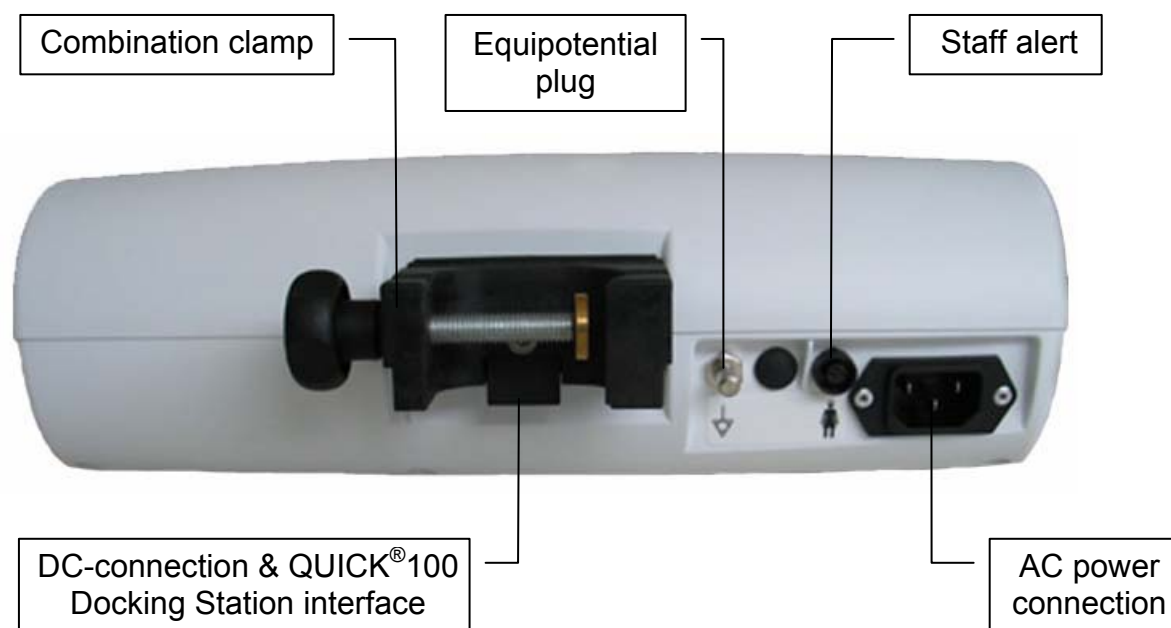
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INTRODUCTION





1. INTRODUCTION

1.1. General

IMPORTANT!

This service manual is intended for the exclusive use of authorized persons who have been trained by ARGUS Medical AG in the maintenance and repair of the ARGUS 600 Syringe pump.

The service manual is meant to be used together with the user manual.

IMPORTANT!

ARGUS Medical AG shall not assume any responsibility for any manipulations which have been carried out on the ARGUS 600 Syringe pump by a non-authorized person.

CAUTION!

The ARGUS 600 Syringe pump may only be used with spare parts, accessories, consumables and syringes with Luer-Lock connections recommended by ARGUS Medical AG. The functional safety of the pump is not guaranteed if non approved materials are used. The safety of the patient may be endangered.

This manual contains the latest data available. It is subject to further modifications in accordance with technical improvements.

2. PUMP CONFIGURATIONS

2.1. General

CAUTION!

The configuration possibilities with the “ARGUS *service*” PC utility tool and without PC assistance constitute a modification of the pump and may only be carried out by authorized persons!

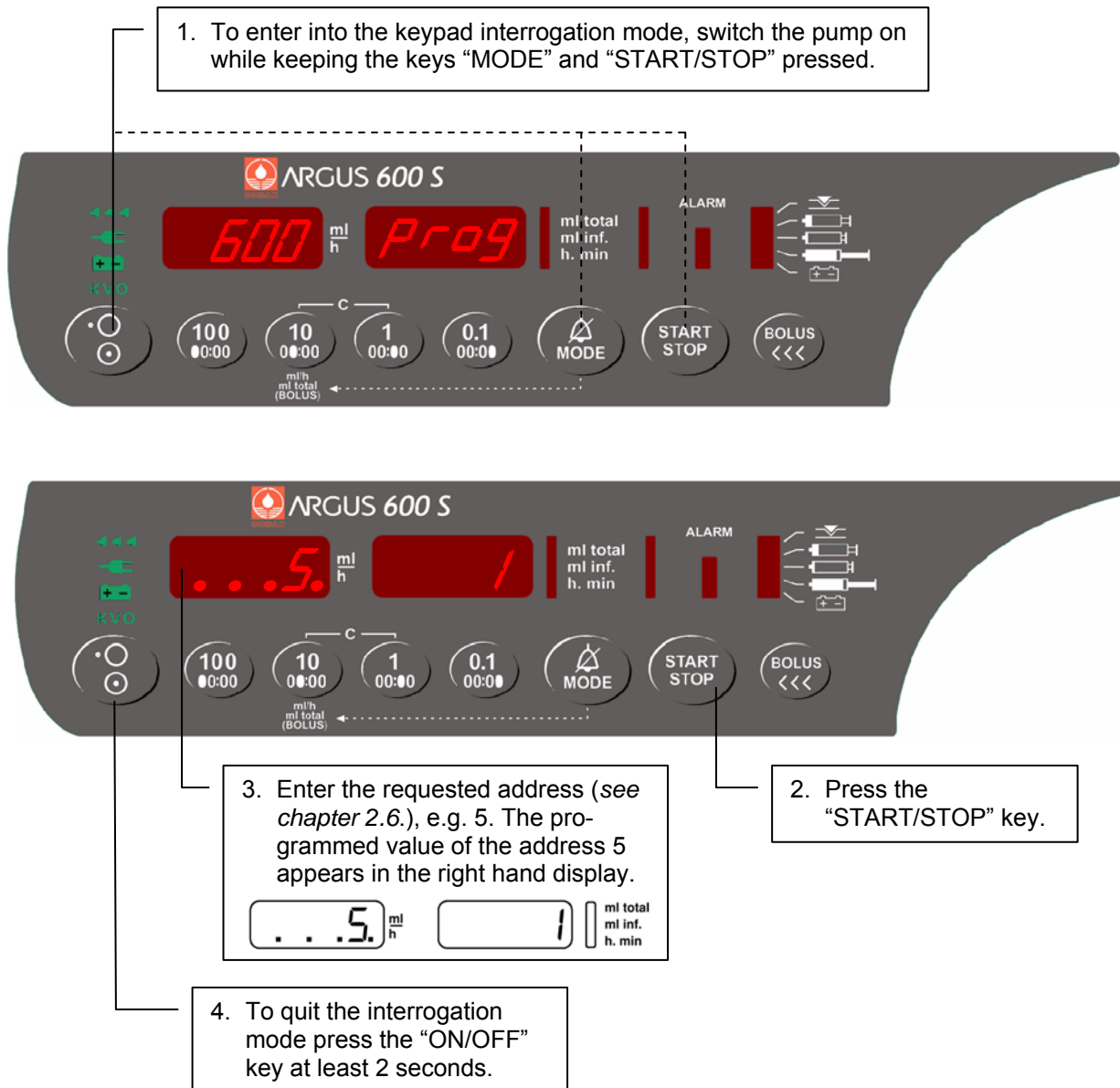
CAUTION!

After changing the configuration a function check and a control measurement has to be performed!



2.2. Interrogation mode (without ARGUS service)

With the interrogation mode you can read the present keypad configuration of the pump without the possibility to modify any configurations. For a complete overview, please take the "ARGUS service" PC-tool!



Flashing decimal points indicate which display is ready to accept an input by the keys 100, 10 & 1.

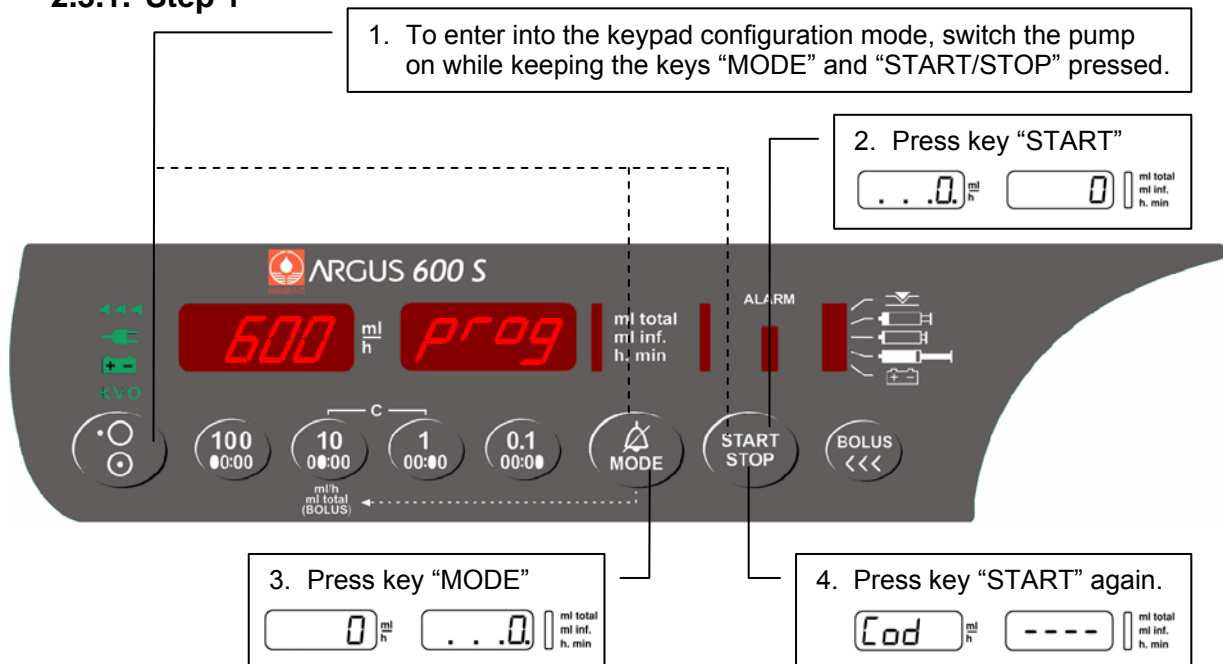
In the keypad interrogation mode the left hand display shows the address and the right hand display shows the according value configured at this address. Please refer to chapter 2.6. where the meanings of the addresses are explained.

To modify any configuration data you have to go into the configuration mode.

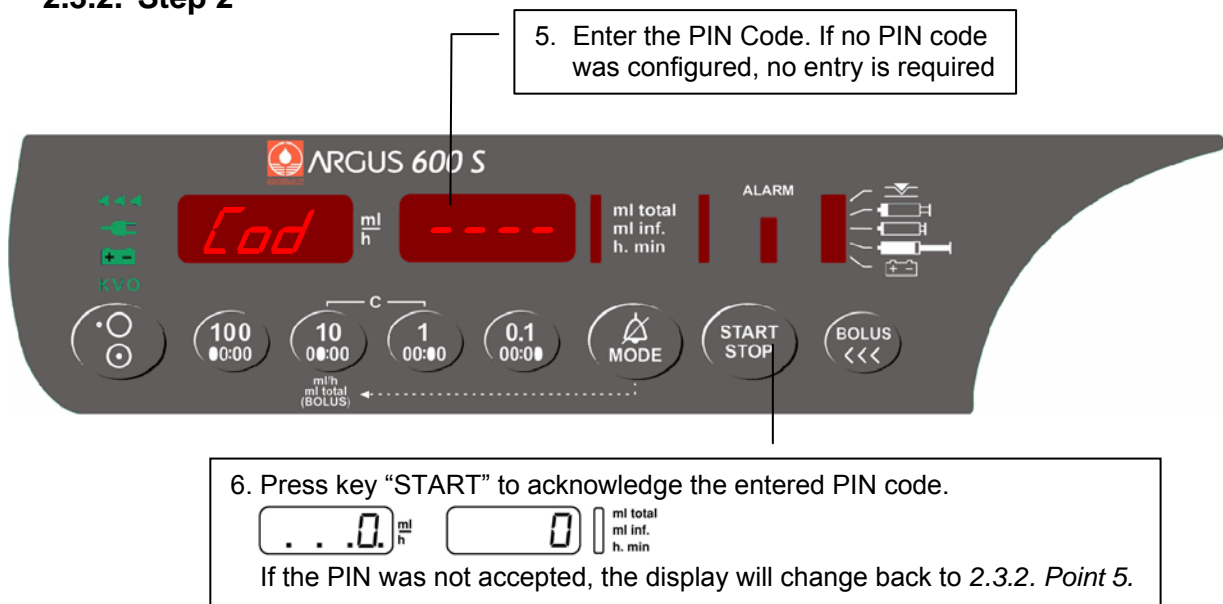
2.3. Configuration mode (without ARGUS service)

The configuration mode permit you to modify the pump keypad configuration manually using the keypad. Please refer to *chapter 2.6.* where the meaning of the addresses are explained. To have access to all configuration options, please use the “ARGUS service” PC-tool!

2.3.1. Step 1



2.3.2. Step 2

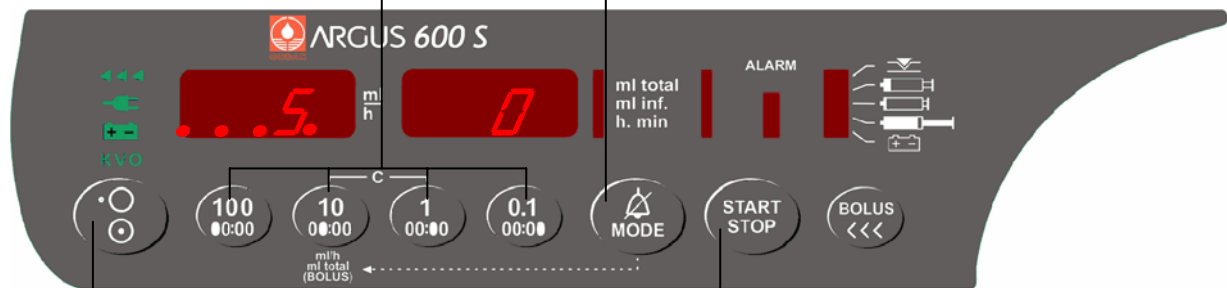


You have now access to all addresses in the list of *chapter 2.6.* Select therefore any address in the left display (see *next page*).

2.3.3. Step 3

8. Enter now the value on the right hand display. The range of the value is given by the table in *chapter 2.6*.

7. After entering an address e.g. 5 press the key "MODE". The flashing decimal points will change to the right hand display.



10. To quit the configuration mode press the "ON/OFF" key at least 2 seconds. Changes in configuration become active, after the pump is switched on normally again.

9. Press key "START/STOP" to acknowledge the entered value. The flashing decimal points change back to the left hand display.



Important remark:

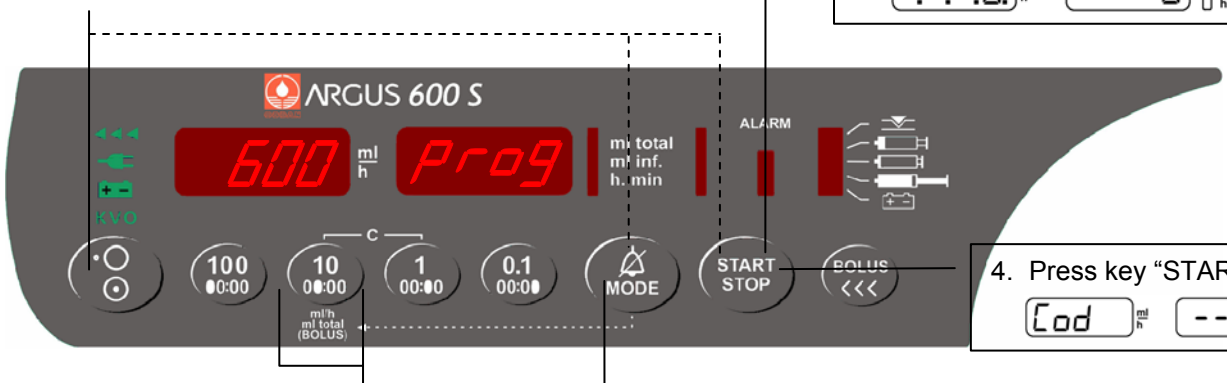
Invalid values entered will be corrected automatically by the pump to the maxima or minima value allowed for the according address!

2.4. First activation of a PIN Code (write protection)

The activation of a PIN code allows you to protect the configuration from unauthorized access. To activate the PIN code, enter into the configuration mode.

1. To enter into the configuration mode, switch the pump on while keeping the keys "MODE" and "START/STOP" pressed.

2. Press key "START"



5. Press "MODE" key (Code "0" will be set) then "START" key to acknowledge the entered PIN code "0".



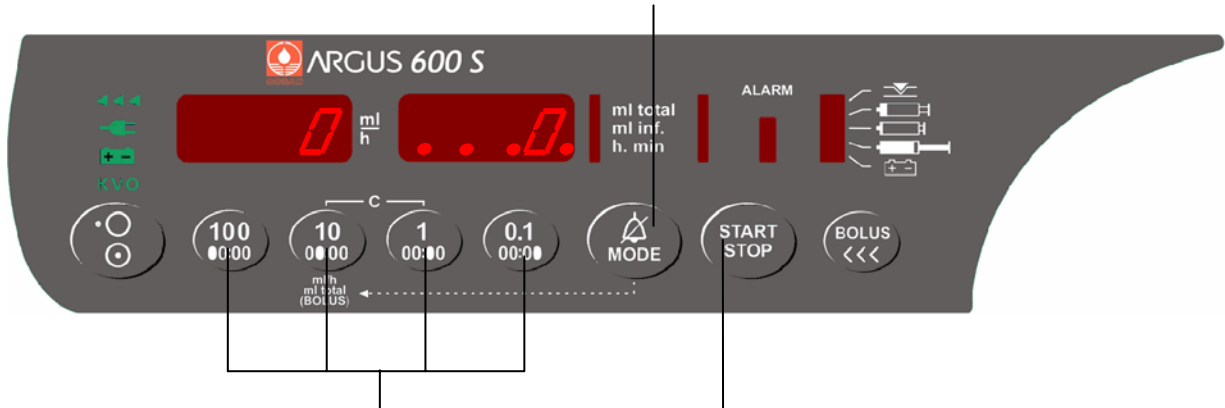
3. Press key "MODE"



4. Press key "START" again



6. Press the "MODE" key. The flashing decimal points will change to the right hand display.



7. Enter now the new PIN Code (max. 4 digit number).
Please remember this code, it will never be visible again!

e.g. ml total
ml inf. h. min

8. Press key "START/STOP" to acknowledge the new PIN.

ml total
ml inf. h. min

CAUTION!

After you switch the pump OFF and ON again you can enter into the configuration mode only, if you enter the correct PIN code.

ml total
ml inf. h. min e.g. ml total
ml inf. h. min

Please note: The interrogation mode can always be accessed without the PIN.

2.5. Changing an existing PIN code

Enter the configuration mode using present PIN, select add. "0" and set new code.

ml total
ml inf. h. min Enter actual PIN code and confirm with "START" key.

ml total
ml inf. h. min Press "MODE" key (#0). The flashing decimal points will change to the right hand display.

ml total
ml inf. h. min

ml total
ml inf. h. min Enter the new PIN code and press the "START/STOP" key to acknowledge the entered code.

ml total
ml inf. h. min

2.6. Address list of the pump configuration (without ARGUS service)

The following list declares the possible configuration options which can be performed on the pump keypad without using the PC.
All these options can also be configured by the PC-Software "ARGUS service".

| Address | Index | Default | Function | Unit | Range |
|--------------|-------|---------|-----------------------------------|------------|---------------|
| left display | PC | | | | right display |
| 1 | 2 | No | Key ON/OFF only at stop valid | - | 0=No / 1=Yes |
| 2 | 11 | Yes | Recall of the last used ml/h rate | - | 0=No / 1=Yes |
| 3 | 19 | Yes | Buzzer at start | - | 0=No / 1=Yes |
| 4 | 44 | Yes | Automatic pressure release | - | 0=No / 1=Yes |
| 5 | 49 | No | Alarm acknowledge with key MODE | - | 0=No / 1=Yes |
| | | | | | |
| | | | | | |
| 100 | 361 | 5 | Key ON/OFF delay time | • 0.1 s | 0 - 31 |
| 101 | 362 | 2 | Display brightness | level | 1 - 3 |
| 102 | 363 | 10 | Buzzer volume | level | 5 - 10 |
| 103 | 365 | 9 | Default pressure limit | • 100 mbar | 2 - 12 |
| | | | | | |
| | | | | | |
| 200 | 368 | 495 | Battery capacity (discharge time) | min | 45 - 615 |
| | | | | | |
| | | | | | |
| 399 | - | 600 | Enter the calibration menu | - | 123 |

Note!

The address does not correspond with the index used by the "ARGUS service" tool.

PUMP CONFIGURATIONS

2.7. Index list of the pump configuration (with ARGUS service)

| Index PC | Add. | Default | Function | Unit | Range |
|----------|------|---------|---|------|----------|
| 1 | | No | Run indication by running decimal point | - | No / Yes |
| 2 | 1 | No | Key ON/OFF only at stop valid | - | No / Yes |
| 3 | | No | Rate change allowed only at STOP | - | No / Yes |
| 4 | | No | Key STOP delayed # 361 | - | No / Yes |
| 5 | | No | Second entry of rate # 3=Yes, # 9=No | - | No / Yes |
| 6 | | No | Static alarm (staff alerting system) | - | No / Yes |
| 7 | | No | Display elapsed time in run mode # 8=No | - | No / Yes |
| 8 | | No | Display remaining time # 7=Yes | - | No / Yes |
| 9 | | No | Rate change confirmation in stop mode | - | No / Yes |
| 10 | | | | | |
| 11 | 2 | Yes | Recall of ml/h rate at next power on # 9=No | - | No / Yes |
| 12 | | No | Recall of ml total at next power on | - | No / Yes |
| 13 | | No | Recall of ml inf. at next power on | - | No / Yes |
| 14 | | No | SBS (step by step function) | - | No / Yes |
| 15 | | No | Display VTBI (volume to be infused) | - | No / Yes |
| 16 | | No | Syringe type acknowledge at start | - | No / Yes |
| 17 | | Yes | KVO (KOR) enabled # 60 | - | No / Yes |
| 18 | | | | | |
| 19 | 3 | No | Buzzer at start | - | No / Yes |
| 20 | | No | Menu Clr (clear ml inf.) # 15=No, # 65 | - | No / Yes |
| 21 | | | | | |
| 22 | | | | | |
| 23 | | Yes | Menu PrL (pressure alarm limit) | - | No / Yes |
| 24 | | Yes | Menu CAP (battery capacity) | - | No / Yes |
| 25 | | | | | |
| 26 | | No | Menu InF (ml inf. since last power on) | - | No / Yes |
| 27 | | No | Menu dLo (data lock) | - | No / Yes |
| 28 | | No | Menu Stb (stand by) | - | No / Yes |
| 29 | | Yes | Menu Med (medication name) | - | No / Yes |
| 30 | | No | Menu tM (timer alarm) | - | No / Yes |
| 31 | | | | | |
| 32 | | Yes | Menu bol "bolu Man" / "bolu Auto" (bolus always possible) | - | No / Yes |
| 33 | | Yes | Menu bolr (bolus rate) # 32=Yes | - | No / Yes |
| 34 | | Yes | Menu tot (bolus total) # 32=Yes | - | No / Yes |
| 35 | | No | Display BOLUS-VTBI | - | No / Yes |
| 36 | | | | | |
| 37 | | | | | |
| 38 | | Yes | Automatic bolus application # 32, 34=Yes | - | No / Yes |
| 39 | | No | Bolus total to be reset after each auto bolus | - | No / Yes |
| 40 | | | | | |
| 41 | | No | Clear ml/h after infusion completed | - | No / Yes |
| 42 | | No | Clear ml total after infusion completed # 41=Yes | - | No / Yes |
| 43 | | Yes | Syringe clamp diameter outside control | - | No / Yes |
| 44 | 4 | Yes | Automatic pressure release after occlusion | - | No / Yes |
| 45 | | Yes | Pressure display ON (LED bar graph - 20/40/60/80/100%) | - | No / Yes |
| 46 | | No | Pressure display with indicator # 45=Yes | - | No / Yes |
| 47 | | No | Stand by- and battery pre alarm low volume | - | No / Yes |
| 48 | | Yes | Flashing numeric display at alarm | - | No / Yes |
| 49 | 5 | No | Alarm acknowledge only with key MODE | - | No / Yes |



PUMP CONFIGURATIONS

| | | | | | | |
|-----|--|-----|--|-----------|----------|----------|
| 55 | | Yes | Med. disp. alternate with rate and ml inf. | # 29=Yes | - | No / Yes |
| 60 | | No | KVO only after infusion completed | | - | No / Yes |
| 65 | | No | Clear and continue | # 15=No | - | No / Yes |
| 75 | | No | Select binder connector for serial interface | | - | No / Yes |
| 100 | | No | User syringe 10 ml | USEr -10- | 10 ml | |
| 101 | | No | BD Plastipak | b-d PL10 | 10 ml | |
| 102 | | No | Braun Omnifix | brn OF10 | 10 ml | |
| 103 | | Yes | Codan | Cod -10- | 10 ml | |
| 104 | | No | Fresenius Injectomat | FrES In10 | 10 ml | |
| 105 | | No | Sherwood Monoject | Mono -10- | 10 ml | |
| 106 | | No | ONCE | OnCE -10- | 10 ml | |
| 107 | | No | PIC Indolor | PIC -10- | 10 ml | |
| 108 | | No | Rymco | ryco -10- | 10 ml | |
| 109 | | No | Terumo | tEru -10- | 10 ml | |
| 110 | | No | Braun Injekt (#43=No) | brn In10 | 10 ml | |
| 111 | | No | Chirana-Prema | Chir -10- | 10 ml | |
| 120 | | No | User syringe 20 ml | USEr -20- | 20 ml | |
| 121 | | No | BD Plastipak | b-d PL20 | 20 ml | |
| 122 | | No | Braun Omnifix | brn OF20 | 20 ml | |
| 123 | | Yes | Codan | Cod -20- | 20 ml | |
| 124 | | No | Sherwood Monoject | Mono -20- | 20 ml | |
| 125 | | No | ONCE | OnCE -20- | 20 ml | |
| 126 | | No | Braun Perfusor | brn PE20 | 20 ml | |
| 127 | | No | Braun Inject | brn In20 | 20 ml | |
| 128 | | No | Chirana-Prema | Chir -20- | 20 ml | |
| 129 | | No | Terumo | tEru -20- | 20 ml | |
| 130 | | No | Penta Ferte | PF -20- | 20 ml | |
| 140 | | No | User syringe 30 ml | USEr -30- | 30 ml | |
| 141 | | No | BD Plastipak | b-d PL30 | 30 ml | |
| 142 | | No | Codan | Cod -30- | 30 ml | |
| 143 | | No | ONCE | OnCE -30- | 30 ml | |
| 144 | | No | Braun Omnifix | brn OF30 | 30 ml | |
| 145 | | No | Terumo | tEru -30- | 30 ml | |
| 146 | | No | Penta Ferte | PF -30- | 30 ml | |
| 150 | | No | User syringe 50 ml | USEr -50- | 50 ml | |
| 151 | | No | BD Perfusion | b-d PE50 | 50 ml | |
| 152 | | No | BD Plastipak | b-d PL50 | 50/60 ml | |
| 153 | | No | Braun Omnifix | brn OF50 | 50/60 ml | |
| 154 | | No | Braun Perfusor | brn PE50 | 50 ml | |
| 155 | | No | Chirana-Prema | Chir -50- | 50/60 ml | |
| 156 | | No | Codan | Cod -50- | 50 ml | |
| 157 | | Yes | Codan Perfusion | Cod PE50 | 50 ml | |
| 158 | | No | Dispomed | dISP -50- | 50/60 ml | |
| 159 | | No | Dipomed Perfusion | dISP PE50 | 50 ml | |
| 160 | | No | Fresenius Injectomat | FrES In50 | 50/60 ml | |



PUMP CONFIGURATIONS

| | | | | | | | |
|-----|--|-------|-----------------------|---------------------------------|------|----------|-----------|
| 161 | | No | Fresenius Perfusion | FrES | PE50 | 50/60 ml | |
| 162 | | No | Ivac | IVAC | -50- | 50/60 ml | |
| 163 | | No | JMS | JMS | -50- | 50/60 ml | |
| 164 | | No | Sherwood Monoject | Mono | -50- | 50/60 ml | |
| 165 | | No | PIC Indolor | PIC | -50- | 50 ml | |
| 166 | | No | PIC Indolor Perfusion | PIC | PE50 | 50 ml | |
| 167 | | No | Rymco | ryco | -50- | 50 ml | |
| 168 | | No | Terumo | tEru | -50- | 50/60 ml | |
| 169 | | No | Disoprivan (ZENECA) | dIPr | -50- | 50 ml | |
| 170 | | No | ONCE | OnCE | -50- | 50 ml | |
| 171 | | No | Braun Proinjekt | brn | Pr50 | 50 ml | |
| 172 | | No | Penta Ferte | PF | -50- | 50 ml | |
| | | | | | | | |
| 310 | | 300.0 | Max. rate | 10 ml syringe parameters | | ml/h | 1 - 300 |
| 311 | | 300.0 | Prime rate | | | ml/h | 1 - 300 |
| 312 | | 300.0 | Max. bolus rate | | | ml/h | 1 - 300 |
| 313 | | 1.0 | Max. total | | | ml | 1 - 10 |
| 314 | | | | | | | |
| 315 | | 61.0 | Syringh length | | | mm | 45 - 70 |
| 316 | | 16.0 | Plunger length | | | mm | 12 - 30 |
| 317 | | 16.2 | Barrel diameter | | | mm | 15 - 19 |
| 318 | | 18.7 | Clamp diameter | | | mm | 15 - 25 |
| 319 | | | | | | | |
| 320 | | 500.0 | Max. rate | 20 ml syringe parameters | | ml/h | 1 - 500 |
| 321 | | 500.0 | Prime rate | | | ml/h | 1 - 500 |
| 322 | | 500.0 | Max. bolus rate | | | ml/h | 1 - 500 |
| 323 | | 2.0 | Max. total | | | ml | 1 - 20 |
| 324 | | | | | | | |
| 325 | | 69.5 | Syringh length | | | mm | 50 - 80 |
| 326 | | 16.8 | Plunger length | | | mm | 12 - 30 |
| 327 | | 21.4 | Barrel diameter | | | mm | 20 - 24 |
| 328 | | 23.8 | Clamp diameter | | | mm | 20 - 30 |
| 329 | | | | | | | |
| 330 | | 500.0 | Max. rate | 30 ml syringe parameters | | ml/h | 1 - 500 |
| 331 | | 500.0 | Prime rate | | | ml/h | 1 - 500 |
| 332 | | 500.0 | Max. bolus rate | | | ml/h | 1 - 500 |
| 333 | | 3.0 | Max. total | | | ml | 1 - 25 |
| 334 | | | | | | | |
| 335 | | 82.0 | Syringh length | | | mm | 70 - 90 |
| 336 | | 16.0 | Plunger length | | | mm | 12 - 30 |
| 337 | | 24.0 | Barrel diameter | | | mm | 22 - 26 |
| 338 | | 26.0 | Clamp diameter | | | mm | 20 - 30 |
| 339 | | | | | | | |
| 340 | | 999.9 | Max. rate | 50 ml syringe parameters | | ml/h | 1 - 999.9 |
| 341 | | 999.9 | Prime rate | | | ml/h | 1 - 999.9 |
| 342 | | 800.0 | Max. bolus rate | | | ml/h | 1 - 800.0 |
| 343 | | 5.0 | Max. total | | | ml | 1 - 25 |
| 344 | | | | | | | |
| 345 | | 90.0 | Syringh length | | | mm | 70 - 100 |
| 346 | | 16.5 | Plunger length | | | mm | 12 - 50 |
| 347 | | 29.4 | Barrel diameter | | | mm | 28 - 34 |
| 348 | | 31.0 | Clamp diameter | | | mm | 25 - 37 |



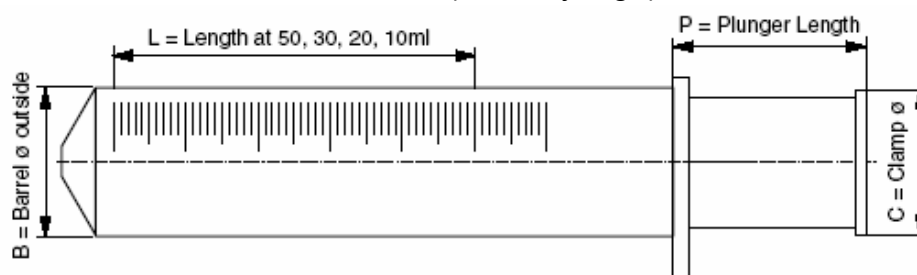
PUMP CONFIGURATIONS

| | | | | | | |
|-----|-----|-----|---|---------|-----------|------------|
| 361 | 100 | 5 | Key ON/OFF delay time | # 4 | • 1/10 s | 0 - 31 |
| 362 | 101 | 2 | Display brightness | | level | 1 - 3 |
| 363 | 102 | 7 | Buzzer alarm volume | | level | 5 - 10 |
| 364 | | | | | | |
| 365 | 103 | 9 | Default pressure limit (PrL levels) | | • 100mbar | 2 - 12 |
| 366 | | 1 | Pressure display unit (mbar / mmHg / kPa / cmH2O / Psi) | | Enum | 1 - 5 |
| 367 | | 3 | Time for near empty alarm | | min | 1 - 15 |
| 368 | 200 | 495 | Battery capacity (discharge time) | | min | 45 - 615 |
| 369 | | 5 | Automatic menu fall back delay time | | sec | 5 - 30 |
| | | | | | | |
| | | | | | | |
| 390 | | 0 | Last service date in year | | year | 0 - 99 |
| 391 | | 0 | Last service date in month | | month | 0 - 12 |
| 392 | | 0 | Last service date in day | | day | 0 - 31 |
| 393 | | 0 | Service interval in months | | month | 0 - 24 |
| 394 | | 0 | Service interval in hours of operation | | hour | 0 - 10000 |
| 395 | | | | | | |
| 396 | | 0 | Pump serial number | | xxx 6 yyy | xxx 6 yyy |
| 397 | | | | | | |
| 398 | | | | | | |
| - | 399 | 600 | Enter the calibration menu / clears protection key | | - | 123 |
| | | | | | | |
| | | | | | | |
| 518 | | 2 | Permissions for serial communication 0 = none, 1 = query only, 2 = parametrising, 3 = remote control | | Enum | 0 - 3 |
| | | | | | | |
| 522 | | No | Allow change of ml total while infusing | # 65=No | - | No / Yes |
| 523 | | | | | | |
| 524 | | | Display a department info text (after power up) | | char | 1-16 ASCII |
| | | | | | | |

Using the “ARGUS service” tool, the complete and detailed pump configuration can be done.

2.8. User syringe

The ARGUS 600 Syringe pump uses syringes from various manufacturers (see user manual list of recommended syringes). If you want to use any other brand you must be sure that the syringe is CE marked and is specified by the syringe manufacturer to be pressure resistant and/or safe to be used with infusion pumps, the syringe must be made out of 3 parts (barrel, plunger, sealing) and have Luer-Lock connection (same applies to extension lines). When all these points are met you are allowed to configure your own "USER" syringe (one per size). Use the “ARGUS service” tool to enter the syringe parameters into index 340 – 348 (50 ml syringe).



2.9. Medication list

2.9.1. General

To display medication names, index 29 (menu "MEd") must be set to "Yes". The selected medication name can be displayed also in alternate mode (rate, ml inf./ med. name) during infusion, for that set index 56 to "Yes".

After enabled special function "Med" the following medication names can be selected via pump keypad (see user manual).

2.9.2. User medication

32 user medication names can be custom defined. Choose between capital and small letters for a better displayed medication name. Because of the 7-segment pump display some characters maybe difficult to read.

| Index PC | Default | Function | Unit | Range |
|----------|----------|-------------------------|------|-------------|
| 561 | UserM 1 | User medication name 1 | char | 1 - 8 ASCII |
| 562 | UserM 2 | User medication name 2 | char | 1 - 8 ASCII |
| 563 | UserM 3 | User medication name 3 | char | 1 - 8 ASCII |
| 564 | UserM 4 | User medication name 4 | char | 1 - 8 ASCII |
| 565 | UserM 5 | User medication name 5 | char | 1 - 8 ASCII |
| 566 | UserM 6 | User medication name 6 | char | 1 - 8 ASCII |
| 567 | UserM 7 | User medication name 7 | char | 1 - 8 ASCII |
| 568 | UserM 8 | User medication name 8 | char | 1 - 8 ASCII |
| 569 | UserM 9 | User medication name 9 | char | 1 - 8 ASCII |
| 570 | UserM 10 | User medication name 10 | char | 1 - 8 ASCII |
| 571 | UserM 11 | User medication name 11 | char | 1 - 8 ASCII |
| 572 | UserM 12 | User medication name 12 | char | 1 - 8 ASCII |
| 573 | UserM 13 | User medication name 13 | char | 1 - 8 ASCII |
| 574 | UserM 14 | User medication name 14 | char | 1 - 8 ASCII |
| 575 | UserM 15 | User medication name 15 | char | 1 - 8 ASCII |
| 576 | UserM 16 | User medication name 16 | char | 1 - 8 ASCII |
| 577 | UserM 17 | User medication name 17 | char | 1 - 8 ASCII |
| 578 | UserM 18 | User medication name 18 | char | 1 - 8 ASCII |
| 579 | UserM 19 | User medication name 19 | char | 1 - 8 ASCII |
| 580 | UserM 20 | User medication name 20 | char | 1 - 8 ASCII |
| 581 | UserM 21 | User medication name 21 | char | 1 - 8 ASCII |
| 582 | UserM 22 | User medication name 22 | char | 1 - 8 ASCII |
| 583 | UserM 23 | User medication name 23 | char | 1 - 8 ASCII |
| 584 | UserM 24 | User medication name 24 | char | 1 - 8 ASCII |
| 585 | UserM 25 | User medication name 25 | char | 1 - 8 ASCII |
| 586 | UserM 26 | User medication name 26 | char | 1 - 8 ASCII |
| 587 | UserM 27 | User medication name 27 | char | 1 - 8 ASCII |
| 588 | UserM 28 | User medication name 28 | char | 1 - 8 ASCII |
| 589 | UserM 29 | User medication name 29 | char | 1 - 8 ASCII |
| 590 | UserM 30 | User medication name 30 | char | 1 - 8 ASCII |
| 591 | UserM 31 | User medication name 31 | char | 1 - 8 ASCII |
| 592 | UserM 32 | User medication name 32 | char | 1 - 8 ASCII |
| | | | | |



2.9.3. Defined medication

| Index PC | Def. | Function | Range |
|----------|------|----------------|----------|
| 600 | Yes | (Medication) | No / Yes |
| 601 | No | Actilyse | No / Yes |
| 602 | No | Adrenaline 0.1 | No / Yes |
| 603 | No | Adrenaline 0.2 | No / Yes |
| 604 | No | Ajmalin | No / Yes |
| 605 | No | Alfentanil | No / Yes |
| 606 | No | Alupent | No / Yes |
| 607 | No | Ambroxol | No / Yes |
| 608 | No | Amiodaron | No / Yes |
| 609 | No | Amphotericine | No / Yes |
| 610 | No | Aprotinin | No / Yes |
| 611 | No | Atracurium | No / Yes |
| 612 | No | Bretylium | No / Yes |
| 613 | No | Bupivacaine | No / Yes |
| 614 | No | Ceruletid | No / Yes |
| 615 | No | Clonidin | No / Yes |
| 616 | No | Diltiazem | No / Yes |
| 617 | No | Dobutamin | No / Yes |
| 618 | No | Dopamine | No / Yes |
| 619 | No | Dopexamine | No / Yes |
| 620 | No | Esmolol | No / Yes |
| 621 | No | Fentanyl | No / Yes |
| 622 | No | Flecainide | No / Yes |
| 623 | No | Fluimucil | No / Yes |
| 624 | No | Flumazenil | No / Yes |
| 625 | No | Furosemid | No / Yes |
| 626 | No | Glucose 5% | No / Yes |
| 627 | No | Glucose 30% | No / Yes |
| 628 | No | Heparin | No / Yes |
| 629 | No | Hydrocortison | No / Yes |
| 630 | No | Insulin | No / Yes |
| 631 | No | Isoprenaline | No / Yes |
| 632 | No | KCl | No / Yes |
| 633 | No | Ketamin | No / Yes |
| 634 | No | Labetalol | No / Yes |
| 635 | No | Lidocain | No / Yes |
| 636 | No | Liothyronin | No / Yes |
| 637 | No | Magnesium | No / Yes |
| 638 | No | Midazolam | No / Yes |
| 639 | No | Milrinone | No / Yes |
| 640 | No | Morphin | No / Yes |
| 641 | No | Nacl 0.9 % | No / Yes |
| 642 | No | Nalbuphin | No / Yes |
| 643 | No | Naloxone | No / Yes |
| 644 | No | Neostigmine | No / Yes |
| 645 | No | Nicardipine | No / Yes |
| 646 | No | Nifedipin | No / Yes |
| 647 | No | Nimodipin | No / Yes |
| 648 | No | Nitroprussiate | No / Yes |
| 649 | No | Noradrenalin | No / Yes |
| 650 | No | Omeprazole | No / Yes |
| 651 | No | Pancuronium | No / Yes |
| 652 | No | Pentoxityllin | No / Yes |
| 653 | No | Phentolamine | No / Yes |
| 654 | No | Phenylephrin | No / Yes |

| Index PC | Def. | Function | Range |
|----------|------|----------------------|----------|
| 655 | No | Procainamide | No / Yes |
| 656 | No | Propafenon | No / Yes |
| 657 | No | Propofol | No / Yes |
| 658 | No | Rapilysin | No / Yes |
| 659 | No | Remifentanyl | No / Yes |
| 660 | No | Risordan | No / Yes |
| 661 | No | Ropivacaine | No / Yes |
| 662 | No | Salbutamol | No / Yes |
| 663 | No | Somatostatin | No / Yes |
| 664 | No | Streptokinase | No / Yes |
| 665 | No | Sufentanil | No / Yes |
| 666 | No | Terbutaline | No / Yes |
| 667 | No | Theopyllin | No / Yes |
| 668 | No | Thiopental | No / Yes |
| 669 | No | Tirofiban | No / Yes |
| 670 | No | Trinitrine | No / Yes |
| 671 | No | Urapidil | No / Yes |
| 672 | No | Urokinase | No / Yes |
| 673 | No | Vasopressine | No / Yes |
| 674 | No | Vecuronium | No / Yes |
| 675 | No | Verapamil | No / Yes |
| 676 | No | User defined med. 1 | No / Yes |
| 677 | No | User defined med. 2 | No / Yes |
| 678 | No | User defined med. 3 | No / Yes |
| 679 | No | User defined med. 4 | No / Yes |
| 680 | No | User defined med. 5 | No / Yes |
| 681 | No | User defined med. 6 | No / Yes |
| 682 | No | User defined med. 7 | No / Yes |
| 683 | No | User defined med. 8 | No / Yes |
| 684 | No | User defined med. 9 | No / Yes |
| 685 | No | User defined med. 10 | No / Yes |
| 686 | No | User defined med. 11 | No / Yes |
| 687 | No | User defined med. 12 | No / Yes |
| 688 | No | User defined med. 13 | No / Yes |
| 689 | No | User defined med. 14 | No / Yes |
| 690 | No | User defined med. 15 | No / Yes |
| 691 | No | User defined med. 16 | No / Yes |
| 692 | No | User defined med. 17 | No / Yes |
| 693 | No | User defined med. 18 | No / Yes |
| 694 | No | User defined med. 19 | No / Yes |
| 695 | No | User defined med. 20 | No / Yes |
| 696 | No | User defined med. 21 | No / Yes |
| 697 | No | User defined med. 22 | No / Yes |
| 698 | No | User defined med. 23 | No / Yes |
| 699 | No | User defined med. 24 | No / Yes |
| 700 | No | User defined med. 25 | No / Yes |
| 701 | No | User defined med. 26 | No / Yes |
| 702 | No | User defined med. 27 | No / Yes |
| 703 | No | User defined med. 28 | No / Yes |
| 704 | No | User defined med. 29 | No / Yes |
| 705 | No | User defined med. 30 | No / Yes |
| 706 | No | User defined med. 31 | No / Yes |
| 707 | No | User defined med. 32 | No / Yes |
| | | | |
| | | | |

REMARK :

Via barcode reader all medication names can be selected, even if they are not released in the configuration.



3. SERIAL COMMUNICATION OF THE PUMP

3.1. General

The ARGUS 600 Syringe pump has two serial interfaces on board. One is wired to the docking interface connector and one is an optional RS232 connector.

Important remark!

Only the optional RS232 connector is galvanic separated. The docking interface on the pump is a non galvanic isolated interface! Do not use the docking interface on the pump together with the interface cable (part 10.093) on a patient!

If the pump is docked into a docking station ARGUS 60 M or ARGUS 100 M, the software switches automatically to the docking interface and the docking station builds the separation device (galvanic isolation) then.

3.2. Serial communication protocol

The following characteristics are basics for all the ARGUS devices (volumetric pumps, syringe pumps, docking stations with V4.xx and PCs) which are intended to communicate with the device mentioned in this service manual.

- Full-duplex RS232, currently 4800Baud for single pumps, 9600 Baud for docking stations (also on master/slave-link).
- Simple master (host/PC) – slave (device) communication (host does polling).
- The host has to repeat the request if there is no valid response.
- Uses a checksum (CRC-8).
- Binary data transmission, thus no ASCII/text parsing.
- Fast & direct communication with pumps on ARGUS docking station.
- Specified timeouts during remote mode.
- Basic framing technique used as in the *Serial Infrared Link Access Protocol (IrLAP) Version 1.1*.

Please contact your local distributor or ARGUS Medical AG for the complete serial communication protocol description.

4. ARGUS SERVICE

4.1. General

The ARGUS *service* utility is a high and user friendly PC software which can configure and upgrade pumps over PC serial COM port. With this Windows based software you can also set pump clock, change PIN code, read and print out history and easily replicate pump configurations, and so on. The modern and clearly structured design of this self-describing PC-tool allows a very easy and rapid modification of the A600 Syringe pump, the A707 & 708 Volumetric pump and the ARGUS docking station. This software may be available from your local distributor or directly from ARGUS Medical.

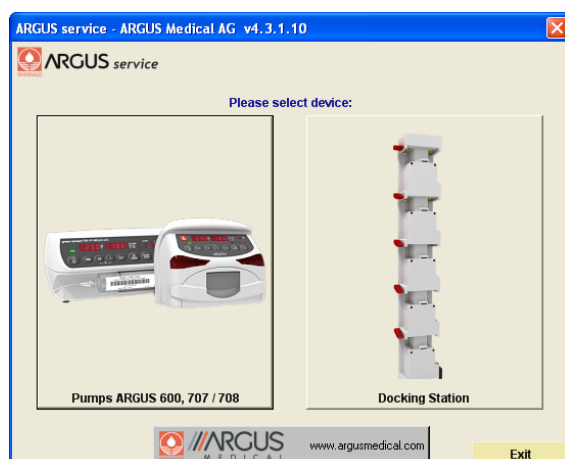
REMARK:

“ARGUS *service*” may only be used with software versions greater or equal to 4.00.

CAUTION!

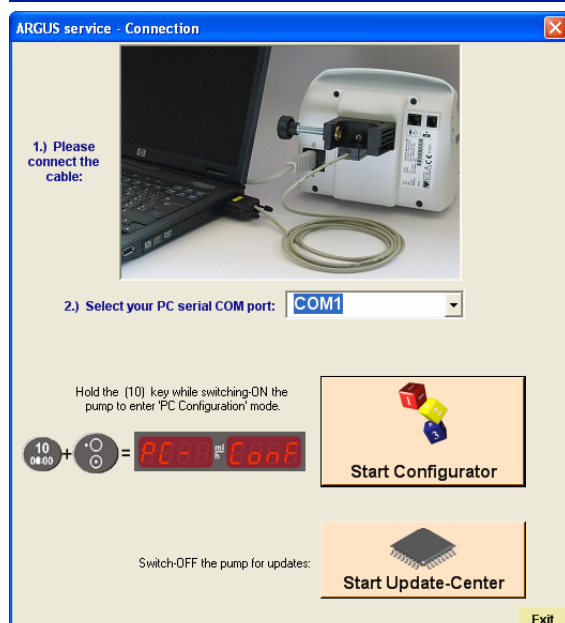
The syringe pump has to be disconnected from the patient before and while the serial interface cable is connected to the pump.

The connection of an A600 over serial interface RS232 can be done by connecting the interface cable (REF 10.093) to the serial interface outlet of the serial PC-COM port.



Start the ARGUS *service*

Press the button which confirm to your previously connected device (ARGUS pump or docking station).



Hold the “10” key while switching-ON the pump.
Select “Start Configuration” (see *next chapter*) or “Start Update-Center” (see *chapter 5.3.2.*).





Select the next step by pressing one of the buttons (configuration, calibration or toolbox).

4.2. ARGUS service – Configuration



Important remark:

After configuration change, a function check and control measurement has to be done!

4.2.1. Configuration tree structure

The configuration is split into 4 areas:

Configuration (part 1)

All configuration possibilities (indexes) mentioned in *chapter 2.7* can be modified herein in its own tree structure as shown below.

All indexes which are different from the pump firmware default are high lighted.

Calibration (part 2)

Details of the pump calibration can be read out of the pump.
The calibration cannot be modified herein.

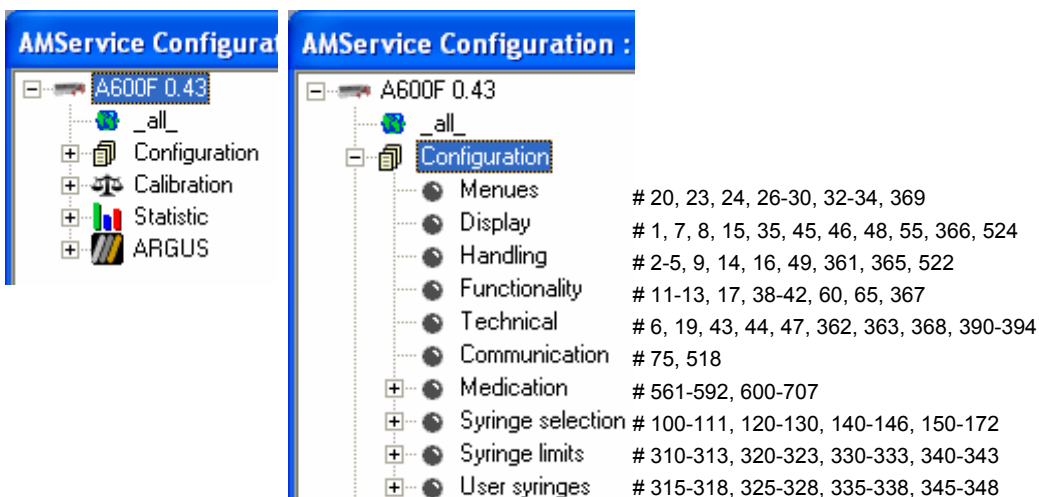
Statistic (part 3)

Details about last used infusion parameters, total of infused volume and infusion time and so on are shown.

Also the last technical failure numbers are listed in this part.

ARGUS (part 4)

This part contains ex-works settings (e.g. pump serial number)



4.2.2. How to edit a configuration

The following procedure describes how to edit a pump configuration:

1. Press the green "Edit" button.
2. The software will ask for the pump PIN code as next. The button "Edit" changes its colour and will be renamed into "Download".
3. If you want to import a configuration from a file press the "Import" button, otherwise skip this point.
4. Select "Configuration" in the structure tree in the left upper frame.
5. Select the category you want to modify by selecting the according structure tree and the according index.
6. Modify the according index (within the given restrictions shown).
Each value (number) must be acknowledged by the green "Enter" button.
Go through point 5 & 6 for all further indexes you want to modify.
7. Press the "Download" button if you want to save the modified configuration on the pump. Otherwise you can save the modified configuration into a file by pressing the "Save" button.
8. **Make a functional check on each pump you have configured.**

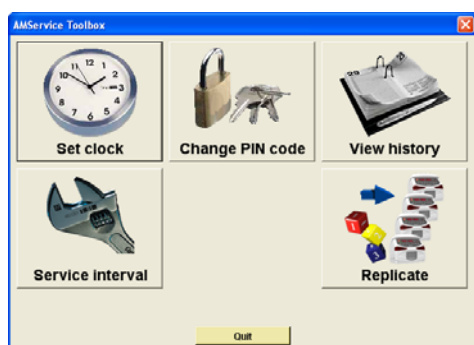
Important remark!

If a config. has been edited (performed point 1 and 2) once do not switch off the pump! Otherwise the pump will change always into the PC-configuration mode automatically.

4.3. ARGUS service - Toolbox



With the "ARGUS service" PC-tool you can set the pump clock, change PIN code, read and print out history, etc.



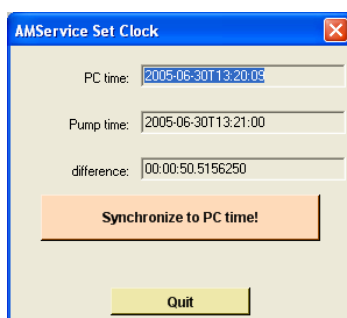
Select the next step by pressing one of the buttons (set clock, change PIN code, view history, service interval or replicate).



4.3.1. ARGUS service - Toolbox - Pump clock



Use this feature to synchronize the pump internal clock with your PC time.

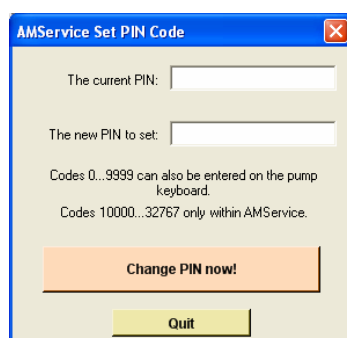


Please note: The pump internal clock will set to the central European time zone (Bern, CET, GMT +1.00h) as ex-works settings, the pump internal clock will not switch automatically between summer and winter time. All history logs (refer to *chapter 4.3.5*) will base on this time.

4.3.2. ARGUS service - Toolbox - PIN code



Use this feature to set the pump PIN code.



The setting of a PIN code prevents access to the pump configuration of third persons.
The default PIN code is "0" by ex-works settings.

Please note: The PIN code corresponds with the PIN code mentioned in *chapter 2.3.2*. If a PIN code greater than 9999 is entered, the pump configuration can only be accessed using the ARGUS service PC tool.

4.3.3. ARGUS service - Toolbox - Service interval



Use this feature to set a reminder alarm on the pump for the next service interval.

A pending reminder alarm will be shown on the pump display after power up by a flashing "Ctrl" text accompanied by an acoustic sound.

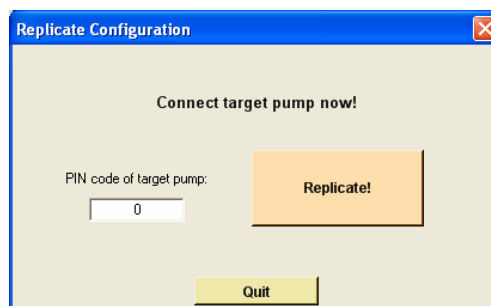
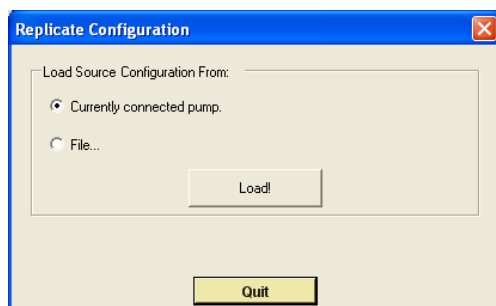
The point in time when an active reminder alarm occurs, is given by the settings of the configuration (#393 and #394) and the pump internal clock. Any value higher than 0 on those indexes will release the reminder alarm after the service interval has elapsed. Please check those settings first, before you set the reminder alarm!

Please note: By the ex-works settings, the reminder alarm is disabled.

4.3.4. ARGUS service - Toolbox - Replicate



Use this feature to replicate fast and easily pump configuration from a saved configuration file or from a pump to another. A configuration can only be replicated if the saved configuration (and pump type) corresponds with the firmware of the connected pump in the first 2 digits (for e.g. 4.30 to 4.31 is possible).



Please note:

The pump internal clock and remainder alarm settings must be done individually on each pump!

4.3.5. ARGUS service - Toolbox - Pump history



Each registered event has his own date & time stamp. An event is registered on each pump status change. Please refer to the complete list mentioned in *chapter 4.3.6.* below.


4.3.6. History messages

Possible messages appearing in the description of each history event:

| | |
|---------------------------|---------------------------------------|
| Battery defective | No information available |
| Battery low prealarm | Exit setup or PC configuration mode |
| Battery low, pump stop | Syringe barrel switch, pump stop |
| Bolus start | Syringe barrel diameter, pump stop |
| Bolus stop | Syringe drive unit, pump stop |
| External power off | Syringe clamp, pump stop |
| External power on | Syringe clutch, pump stop |
| Occlusion, pump stop | Syringe empty, pump stop |
| PrLimit change | Syringe near empty |
| Pump has detected failure | Timer alarm, pump stop (KVO) |
| Pump off | Total volume reached, pump stop (KVO) |
| Pump on | Logon in PC configuration mode |
| Pump start | Logoff in PC configuration mode |
| Pump stop (KVO) | Infsum cleared |
| Rate change | Pump start, ext. changed parameters |
| Enter setup mode | Any defaults written in EEPROM area |
| Data lock off | CRC error in PC configuration mode |
| Data lock on | Enter PC configuration mode |
| Pump off in remote mode | PC communication timeout reached |
| Total (VTBI) change | Pump start in remote mode |
| | Rate change during remote mode |

4.3.7. History printout example

ARGUS service - History



Type: ARGUS600 (Flash)
Version: 0.43
Serial: 534 6 510

Report...

EMail ARGUS

Quit

| Description | Time | Rate | InfSum | Total | PrL | Syringe | Flags | Cause | # |
|---------------------------------------|---------------------|-------|--------|-------|-----|---------|-------|-------|-----|
| •○ Pump off | 2006-02-21T14:07:58 | 711.0 | 44.3 | 0.0 | 900 | 157 | 0 | 11 | 177 |
| ☐ Syringe near empty | 2006-02-21T14:05:42 | 711.0 | 17.4 | 0.0 | 900 | 157 | 0 | 21 | 176 |
| •○ Rate change | 2006-02-21T14:05:42 | 711.0 | 17.4 | 0.0 | 900 | 157 | 0 | 15 | 175 |
| •○ Rate change | 2006-02-21T14:05:38 | 611.0 | 16.8 | 0.0 | 900 | 157 | 0 | 15 | 174 |
| •○ Pump start | 2006-02-21T14:05:32 | 411.0 | 16.1 | 0.0 | 900 | 157 | 0 | 13 | 173 |
| ☐ Syringe empty, pump stop | 2006-02-21T14:05:04 | 411.0 | 16.1 | 0.0 | 900 | 157 | 0 | 20 | 172 |
| ☐ Syringe near empty | 2006-02-21T14:03:08 | 411.0 | 2.7 | 0.0 | 900 | 157 | 0 | 21 | 171 |
| •○ Rate change | 2006-02-21T14:03:08 | 411.0 | 2.7 | 0.0 | 900 | 157 | 0 | 15 | 170 |
| ☐ Syringe near empty | 2006-02-21T14:02:46 | 401.0 | 0.3 | 0.0 | 900 | 157 | 0 | 21 | 169 |
| •○ Rate change | 2006-02-21T14:02:46 | 401.0 | 0.3 | 0.0 | 900 | 157 | 0 | 15 | 168 |
| •○ Pump start | 2006-02-21T14:02:42 | 301.0 | 0.0 | 0.0 | 900 | 157 | 0 | 13 | 167 |
| •○ Pump on | 2006-02-21T14:02:32 | 1.0 | 0.0 | 0.0 | 900 | 0 | 0 | 12 | 166 |
| •○ Pump off | 2006-02-21T14:02:14 | 1.0 | 4.0 | 0.0 | 900 | 157 | 0 | 11 | 165 |
| •○ Rate change | 2006-02-21T14:02:08 | 1.0 | 4.0 | 0.0 | 900 | 157 | 0 | 15 | 164 |
| ☐ Syringe near empty | 2006-02-21T14:02:04 | 601.0 | 3.7 | 0.0 | 900 | 157 | 0 | 21 | 163 |
| •○ Pump start | 2006-02-21T14:02:04 | 601.0 | 3.7 | 0.0 | 900 | 157 | 0 | 13 | 162 |
| ☐ Syringe barrel diameter, pump stop | 2006-02-21T14:01:46 | 601.0 | 3.7 | 0.0 | 900 | 157 | 0 | 31 | 161 |
| ☐ Syringe near empty | 2006-02-21T14:01:24 | 601.0 | 0.0 | 0.0 | 900 | 157 | 0 | 21 | 160 |
| •○ Pump start | 2006-02-21T14:01:24 | 601.0 | 0.0 | 0.0 | 900 | 157 | 0 | 13 | 159 |
| •○ Pump on | 2006-02-21T14:01:16 | 1.0 | 0.0 | 0.0 | 900 | 0 | 0 | 12 | 158 |
| ☐ Exit setup or PC configuration mode | 2006-02-21T14:01:12 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0 | 27 | 157 |
| •○ Pump off | 2006-02-21T14:01:10 | 1.0 | 392.7 | 0.0 | 900 | 157 | 0 | 11 | 156 |
| •○ Pump start | 2006-02-20T06:39:00 | 1.0 | 361.3 | 0.0 | 900 | 157 | 0 | 13 | 155 |
| ☐ Syringe empty, pump stop | 2006-02-19T22:43:58 | 1.0 | 361.3 | 0.0 | 900 | 157 | 0 | 20 | 154 |
| ☐ Syringe near empty | 2006-02-19T22:41:14 | 1.0 | 361.3 | 0.0 | 900 | 157 | 0 | 21 | 153 |
| •○ Pump start | 2006-02-17T17:18:58 | 1.0 | 307.9 | 0.0 | 900 | 157 | 0 | 13 | 152 |

All pre-alarms, alarms and technical failures are high lighted in a different colour.

5. SOFTWARE UPDATES

5.1. General

This chapter describes the procedure to perform a software update on the ARGUS 600 Syringe pump. To check the installed software release in your ARGUS 600 S press the "MODE" key while switching on the pump.

Please refer to your local distributor or ARGUS Medical AG to determine the latest software release able to run on your device hardware.

NOTE: Flash upgrades are only possible, starting from software version 3.0X.

5.2. Requirements for a software update

To update an ARGUS Medical device, the following items are needed:

- PC with Microsoft® Windows™ 2000 or newer, .NET Framework must be installed!
- RS-232 serial interface cable (part no. 10.093)
- PC configuration tool "ARGUS *service*"
- Latest firmware included in a text file named "A600_xxx.txt".
("xxx" is the placeholder for the firmware version).

Those items are available from your local distributor or from ARGUS Medical AG.

5.3. Software update procedure

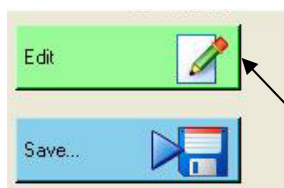
5.3.1. General

Please carefully check the software present installed on the pump. If you have a firmware < version 4.xx please follow *chapter 5.3.2* to upgrade the firmware.

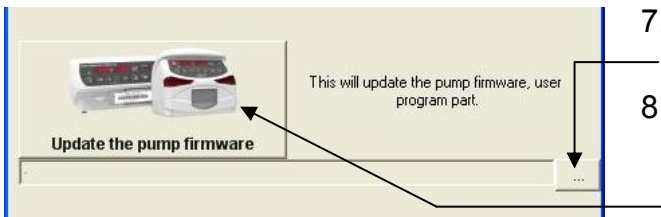
5.3.2. Update of a pump with firmware > V4.xx

Important remark!

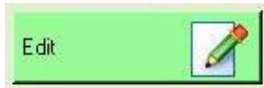
The actual calibration (and configuration) will be stored in a file on the PC, please be sure you will restore the correct file into the pump after the firmware update. Otherwise invalid calibration values will be stored on the pump.



1. Connect the pump to the serial interface of your PC. Please remember the COM port number where you have connected the pump.
2. Switch the pump **ON** while keeping key [10] pressed.
3. Start the PC configuration tool "ARGUS *service*" and select the according COM port.
4. Go into the configuration part and save the present pump configuration (incl. calibration) to a file.
5. Close the "ARGUS *service*" and switch the pump **OFF**.
6. Perform point 3 again, go into the "Update center".



7. Select the requested pump firmware file by pressing the button "...".
8. Press "Update the pump firmware". Follow the instructions displayed on the PC. The firmware will be installed and the pump will be switched off automatically.



9. Go into the configuration part again (refer to point 2-3). Press the "Edit" button and enter the pump PIN code (default PIN after firmware update is 0).



10. Restore the old configuration (incl. calibration) from the **previous** created file.



11. Restore the configuration by pressing the "Download" button.

12. Perform a standard safety check (see chapter **Error! Reference source not found.**), normally the calibration will not be destroyed if the procedure is carefully performed step by step.

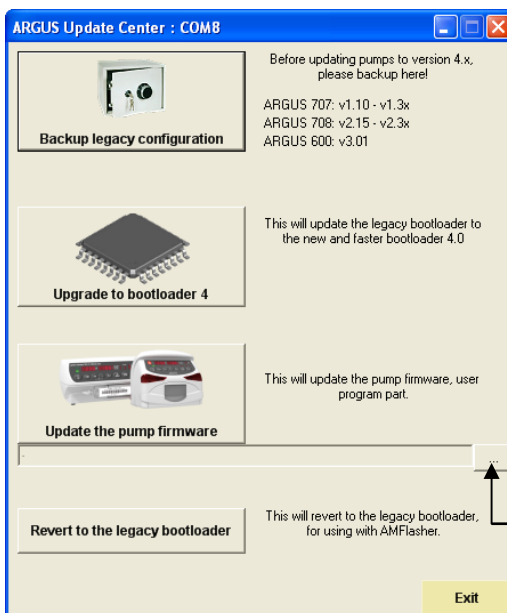
5.3.3. Upgrade of a pump with firmware < V4.xx

With the "Update center" it is also possible to upgrade pump firmware older than V4.xx.

Important remarks!

The actual calibration (and configuration) will be stored temporary on the PC, please perform the upgrade procedure pump by pump. Otherwise invalid calibration values will be stored on the pump.

It is urgent necessary to perform a standard safety check (see chapter 10)!



1. Go into the "Update center" (see point 1-4 of chapter 5.3.2.):
2. Switch the pump ON by keeping the key [10] pressed.
3. Backup the legacy configuration (present configuration before the firmware update). This may take several seconds.
4. Switch the pump OFF.
5. Press "Upgrade to bootloader 4". Follow the instructions displayed on the PC. The bootloader will be upgraded then.
6. Select the requested pump firmware file by pressing the button "...".
7. Press "Update the pump firmware". Follow the instructions displayed on the PC. The firmware will be installed and the pump will be switched off automatically.





8. Switch the pump ON while keeping key [10] pressed. Start the “ARGUS service” tool and select the according COM port.
9. Import configuration *from backup*. The calibration values and configuration of last connected pump will be imported.
10. Download it to the pump by pressing the “Download” button.
11. **Important:**
Perform a standard safety check (see *chap. 10*), the calibration values maybe lost during the upgrade procedure!

5.4. Safety aspects

Be aware of the following points:

- ! For medical device traceability your local distributor or ARGUS Medical AG needs to be informed about every device updates (serial number) you performed!
- ! Do not make any software updates when the device is used and/or connected to a patient!

CAUTION!

A standard safety check (see *chapter 10*) has to be performed after every software update!



6. MAINTENANCE

6.1. General

CAUTION!

Only authorized persons who have been trained by ARGUS Medical AG or by the local distributor are allowed to service the ARGUS 600 Syringe pump. In case of repair request, send the unit with the filled out “repair order form” (see *chapter 11*) to the local distributor. Further information is available from:

ARGUS Medical AG
CH-3627 Heimberg / Switzerland
E-mail: info@argusmedical.com

CAUTION!

The Safety Standard Check (SSC) has to be performed at least every 24 month or after 10'000 hrs of operation. The check has to be done in accordance to *chapter 10*. No special maintenance of the ARGUS 600 Syringe pump is necessary. There are no wear and tear parts.

6.2. Recalibration

6.2.1. General

The ARGUS 600 Syringe pump has been calibrated by the manufacturer with a calibrated spring gauge. The basic ex works configuration enables only one CODAN syringe type per size. To select a different pre-configured syringe, see *chapter 2.7*.

CAUTION!

For a new syringe calibration of a none recommended brand, see *chapter 2.6*.



6.3. Final calibration

6.3.1. General

The ARGUS 600 Syringe pump contains different calibration steps:

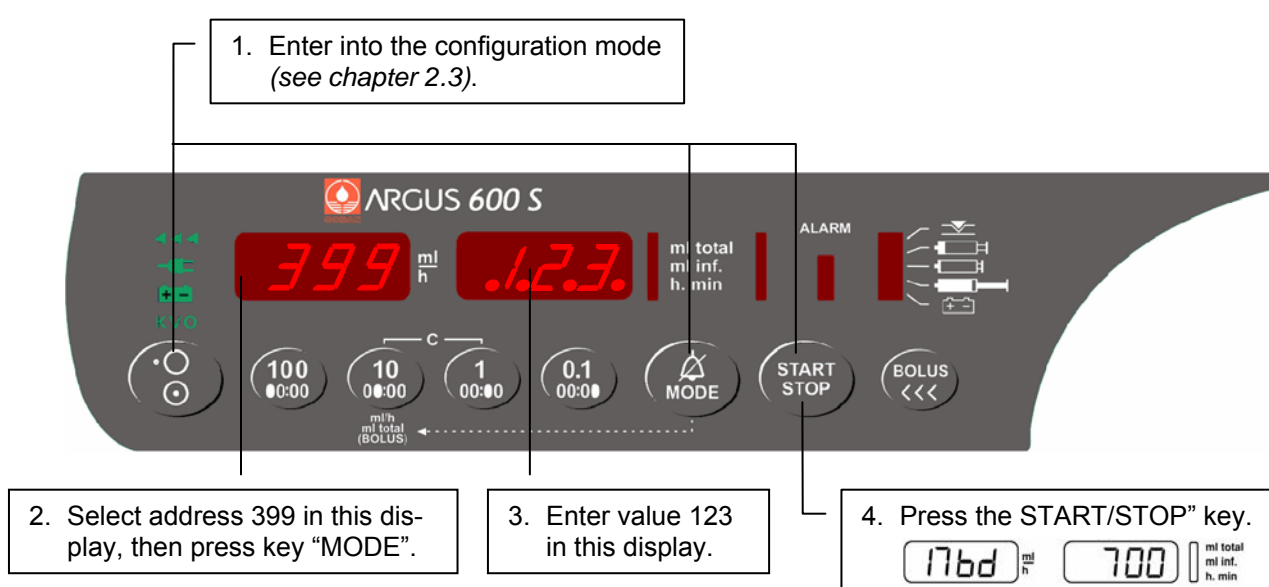
- *syringe barrel holder* (pulled and unpulled)
- *drive unit* (totally left and right)
- *clamp* (fully closed and opened)
- *barrel diameter* (17 and 31 mm)
- *plunger length* (20 and 120 mm)
- *clamp diameter* (20 and 32 mm)
- *pressure limit* (0.2 and 1.2 bar)

CAUTION!

A calibration becomes necessary if the pressure control measurements were not accurate enough, a new syringe configured or any spare part was replaced (e.g. pressure sensor, main board, etc.)

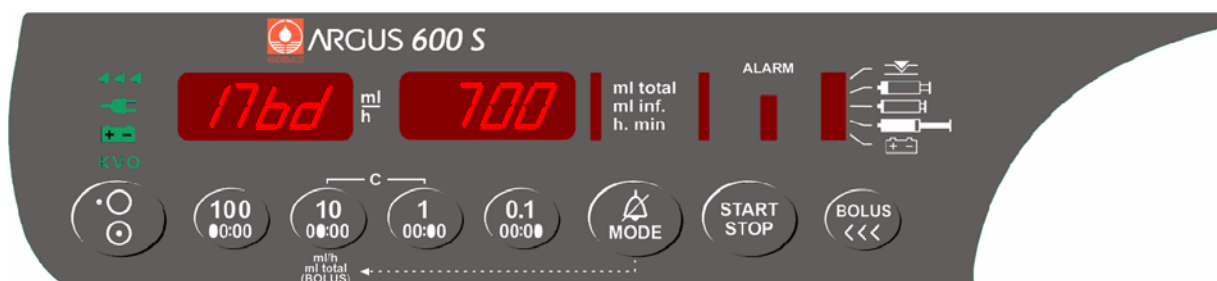
- Needed equipment:
- a manometer with a resolution of 0.1 bar
 - a 3-way stop cock
 - a syringe extension line
 - calibration part-2 & part-3
 - a recommended 50 ml syringe

6.3.2. Enter into the calibration mode



6.3.3. Syringe barrel holder range verification (barrel diameter)

Please verify that the displayed values in the right hand display are within the correct ranges (without calibration part)



Valid range for the syringe barrel holder (*unpulled*): **700 ±300**

Valid range for the syringe barrel holder (*pulled*): **4200 ±300**

NOTE!

Please refer to chapter "Rough alignments" if the displayed value is out of range!

6.3.4. Drive unit range verification (plunger)

Press "MODE" key and verify that the displayed values in the right hand display are within the correct ranges (without calibration part)



Valid range for the drive unit (*totally left*): **600 ±200**

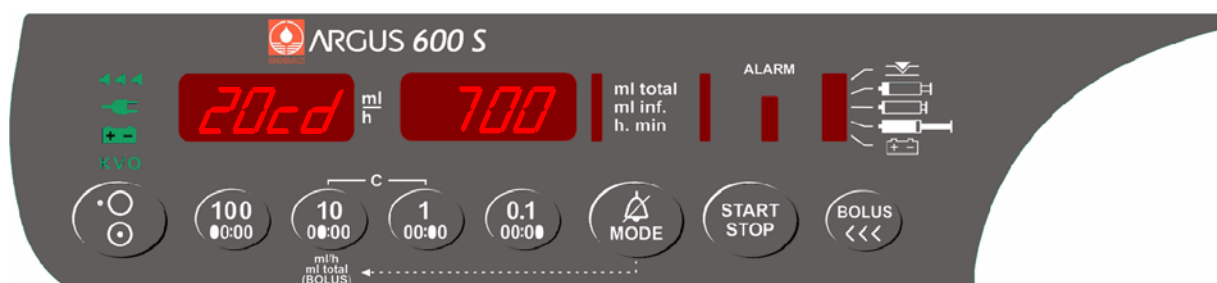
Valid range for the drive unit (*totally right*): **4400 ±200**

NOTE!

Please refer to chapter "Rough alignments" if the displayed value is out of range!

6.3.5. Clamp range verification (clamp diameter)

Press “MODE” key and verify that the displayed values in the right hand display are within the correct ranges (without calibration part)



Valid range for the clamp (*fully closed*): **600 ±300**

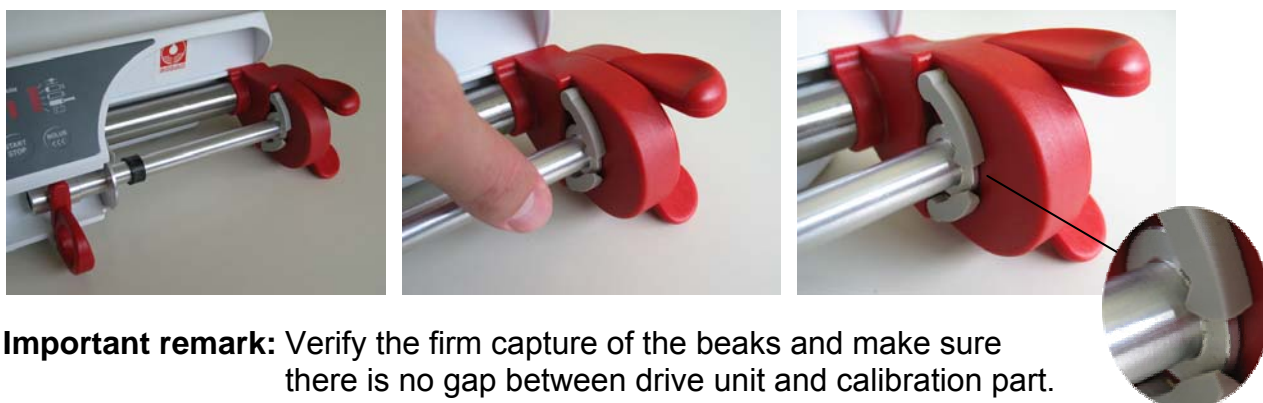
Valid range for the clamp unit (*fully opened*): **2500 ±300**

NOTE!

Please refer to chapter "Rough alignments" if the displayed value is out of range!

6.3.6. Syringe barrel holder diameter calibration (part-3)

Press “MODE” key until the display indicates “17bd” “xxxx” and put the calibration part-3 (Ø17, l=120mm) in place.



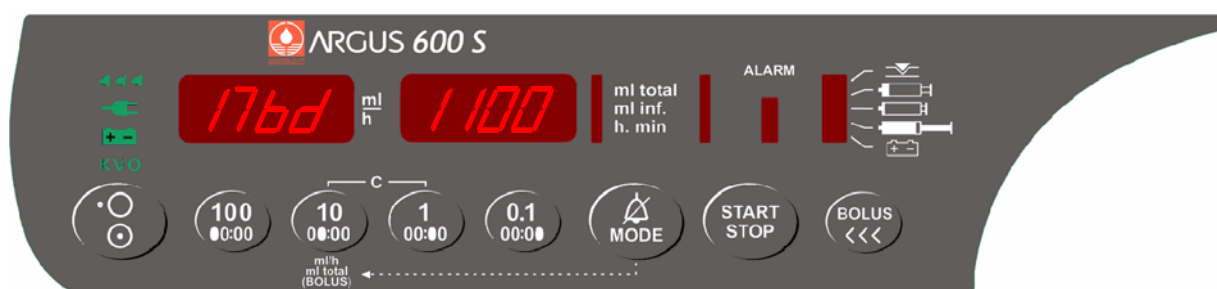
Important remark: Verify the firm capture of the beaks and make sure there is no gap between drive unit and calibration part.



calibration part-1
(REF 11.194)



calibration part-3
(REF 10.153)

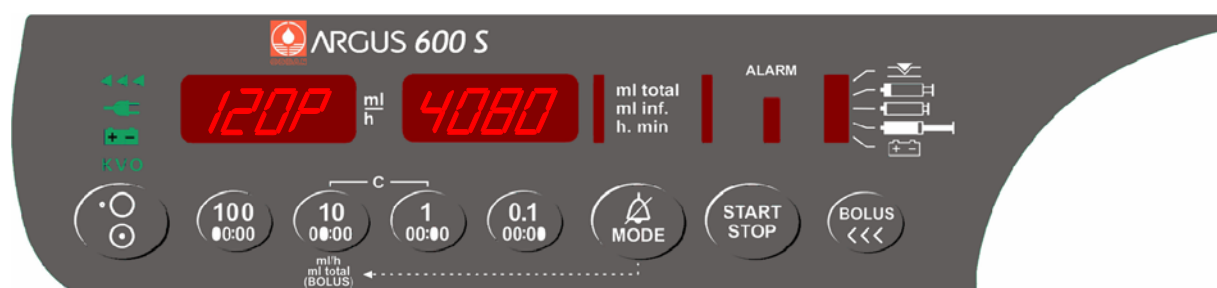


Press “START/STOP” key to store the barrel diameter for 17 mm.

NOTE! Each stored value will be acknowledged by a sound.

6.3.7. Drive unit (plunger) length calibration (part-3)

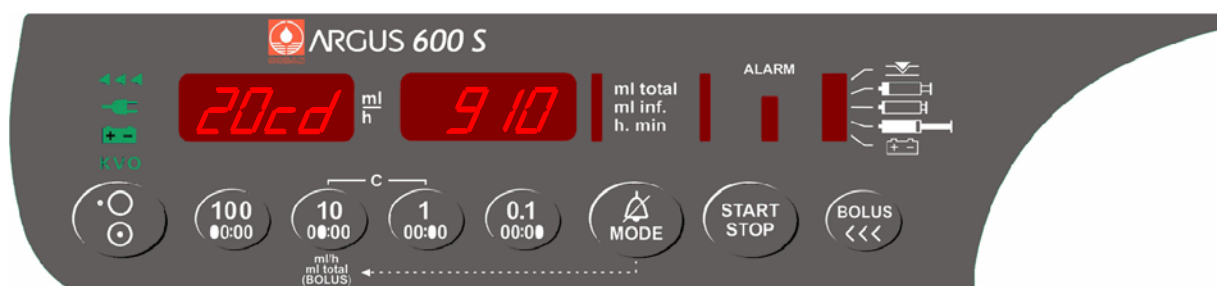
Press “MODE” key, the display indicates “120P” “xxxx”.



Press “START/STOP” key to store the plunger length for 120 mm.

6.3.8. Clamp diameter calibration (part-3)

Press “MODE” key, the display indicates “20cd” “xxxx”.



Press “START/STOP” key to store the clamp diameter for 20 mm and then remove the calibration part-3.

6.3.9. Syringe barrel holder diameter calibration (part-1)

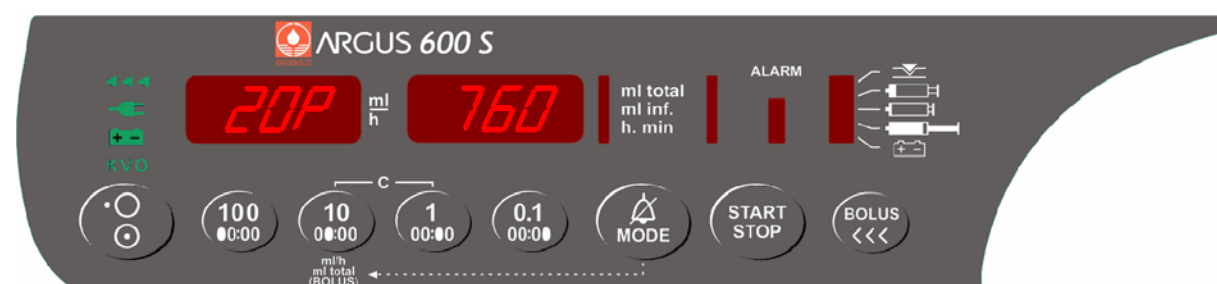
Press "MODE" key, the display indicates "31bd" "xxxx", then put the calibration part-1 ($\varnothing 31$, l=20mm) in place.



Press "START/STOP" key to store the barrel diameter for 31 mm.

6.3.10. Drive unit (plunger) length calibration (part-1)

Press "MODE" key, the display indicates "20P" "xxxx".



Press "START/STOP" key to store the plunger length for 20 mm.

6.3.11. Clamp diameter calibration (part-1)

Press "MODE" key, the display indicates "32cd" "xxxx".



Press "START/STOP" key to store the clamp diameter for 32 mm and then remove the calibration part-1.

6.3.12. Pressure limit calibration (minimal)

Insert a filled 50 ml syringe and connect the patient line to the pressure measurement system (manometer). Press "MODE" key, the display indicates "0.2b" "xxxx" and the pump starts to run with a low rate. Close the line (occl.)



Simulate an occlusion by the 3-way stop cock and start a pressure build-up. Wait until 0.2 bar is reached on the scale and then press the "START/STOP" key immediately, to register the minimal pressure limit value for 0.2 bar.

NOTE!

To speed up the process increase the infusion rate in steps, by pressing the key "1". It is recommended to reduce the rate (with key "100") when the pressure on the manometer is close to 0.2 bar, this allows a more precise calibration.

Important remark:

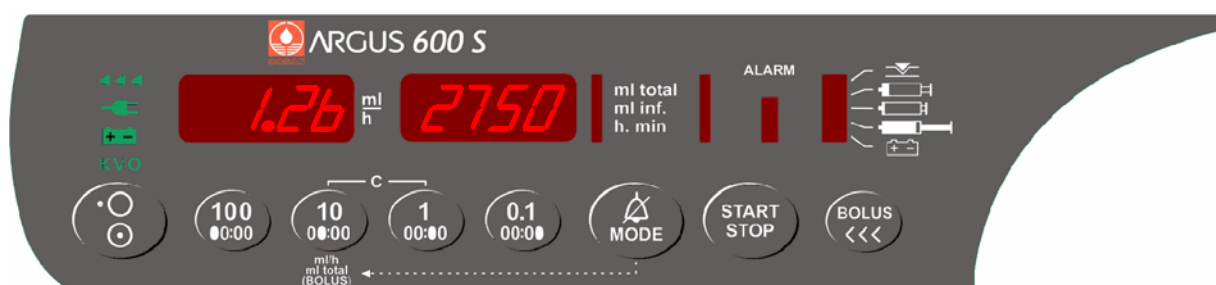
For each pressure calibration step, a new syringe from the same brand and batch must be used. For a more precise calibration, use a spring gauge. The ex works calibration has been performed with a spring gauge.



The spring gauge can be ordered directly from ARGUS Medical AG.

6.3.13. Pressure limit calibration (maximal)

Press "MODE" key, the display indicates "1.2b" "xxxx" and the pump continuous to run with a low rate.



Wait until 1.2 bar is reached on the scale and then press the "START/STOP" key immediately, to register the maximal pressure limit value for 1.2 bar. Switch off the pump.

NOTE!

To speed up the process increase the infusion rate in steps, by pressing the key "1". It is recommended to reduce the rate (with key "100") when the pressure on the manometer is close to 1.2 bar, this allows a more precise calibration.

6.4. Pressure control and pump accuracy measurement

Pressure control

Start an infusion at an infusion rate of 200 ml/h according to the user manual and set the pressure limit at 900 mbar. Connect a manometer with the system to see the pressure in the tube and then simulate a downstream occlusion.

The pump must stop and the alarm must be activated at the default pressure limit of 900 mbar \pm 200 mbar.

If the result of this control measurement does not fulfil the stated requirement, a pressure calibration according to chapter "Final calibration" has to be done.

Pump accuracy

Select a 50 ml syringe (e.g. Cod -50-) to check the pump accuracy. Insert a new syringe (e.g. Codan Perf. 50 ml) filled with distilled water and start to pump into a cup placed on a balance.

Pump settings: set rate at 200 ml/h, set "ml total" at 20 ml
Net weight result: 20 g \pm 2%

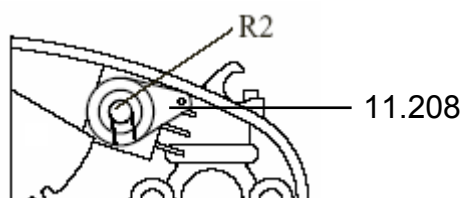
6.5. Rough alignments

Drive unit (plunger) length (P):

- Go into the configuration mode (see chapter 2.3)
- Select address 399
- Press key "MODE"
- Enter data 123
- Press key "START/STOP", the display indicates "17bd" "xxxx"
- Press key "MODE" until "120P" "xxxx" is displayed
- Loosen the lock screw of the cogwheel on the plunger potentiometer axle
- Move syringe drive (without syringe) fully to the left
- Turn the potentiometer axle in clockwise direction up to the final position and afterwards in the counter clockwise direction until approx. 600 is displayed
- Fix the lock screw!
- Control whether the full stroke can be made

Syringe clamp diameter (cd):

- Go into the configuration mode (see chapter 2.3)
- Select address 399
- Press key "MODE"
- Enter data 123
- Press key "START/STOP", the display indicates "17bd" "xxxx"
- Press key "MODE" until "20cd" "xxxx" is displayed
- Remove the syringe and make sure the clamp is fully closed
- Remove the cover of the drive unit (10.151)
- Remove the clamp spring
- Loosen the lock screw of the position lever (11.208)



- Turn carefully the potentiometer axle (R2) in counter clockwise direction up to the final position
- Turn position lever (11.208) counter clockwise until it touches the housing (see picture above)
- Fix the lock screw (make sure the position lever touches the housing)
- Re-install the clamp spring, then a value of approx. 600 is displayed
- Re-install the cover of the drive unit
- Control whether the clamp stroke can be made

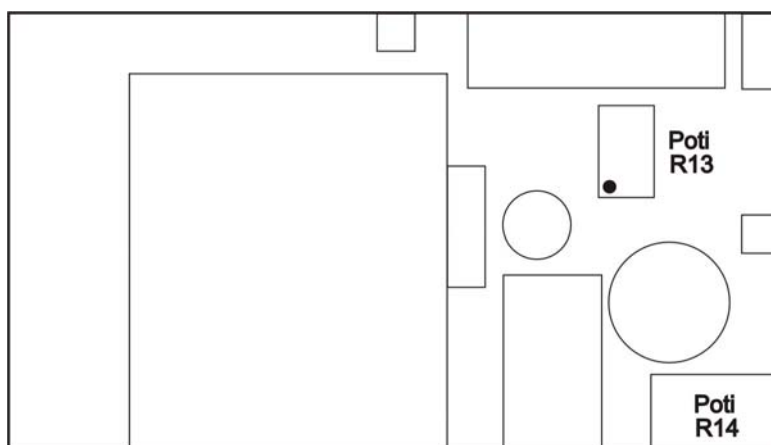
Syringe barrel holder diameter (bd):

- Go into the configuration mode (see chapter 2.3)
- Select address 399
- Press "MODE" key
- Enter data 123
- Press "START/STOP" key, the display indicates "17bd" "xxxx"
- Loosen the lock screw of the potentiometer R14 on the power board
- Turn the potentiometer axle (R14, on the power board) in the counter clockwise direction up to the final position and afterwards in the clockwise direction until approx. 700 appears in the display.
- Fix the lock screw
- Control whether the syringe barrel can make the full stroke.

Strain (pressure) gauge (b):

Caution: No syringe is inserted and the syringe drive is positioned fully right.

- Go into the configuration mode (see chapter 2.3)
- Select address 399
- Press "MODE" key
- Enter data 123
- Press key "MODE" several times until "0.2b" "xxxx" is displayed.
- Adjust the screw of the trimmer (R13, on the power board) until approx. 1500 is displayed.



Power Board



6.6. Battery capacity calibration

Each battery is subject to a chemical process with a slowly decreasing running time. After many charge and discharge cycles the battery may not have the capacity to provide the running time shown in the menu "CAP".

To adjust the running time of the used battery please follow these steps:

- Go into the configuration mode (see *chapter 2.3*).
- Select address "200" in the left display (or index "368" if you are using the "ARGUS service" tool).
- Enter the data "615" in the right display and press the "START/STOP" key to accept the data. This will set the battery discharge time to the maximum of >10 hours.
- Switch the pump off.
- Be sure you have unplugged the line connection.
- Switch the pump on and run the pump on battery until it switches off.
- Charge the battery for more than 16 hours.
- Switch on the pump and start an infusion with a rate of 5 ml/h. The infused sum at this rate multiplied by 12 is now equal to battery operating time in minutes.
- Leave the pump running on battery until it switches off again.
- Connect pump to the AC line.

- Switch the pump on while keeping the key "1" pressed. Multiply the value in the right display by 12, this gives the capacity of the battery in minutes. Multiply this time by 0.8 and enter the result on address "200" in the configuration mode (or index "368" if you are using the "ARGUS service" tool). This time defines from now on, the battery running time of the pump including a 15 minutes pre-alarm (valid after a full charge).

- *Standard battery 6V/1.2 Ah*
If this time is less than 2 h, you should replace the battery (part 12.032). If the specified typical time of 2 h is not required, the battery has to be changed only if the time less than 1.5 h, to respect to environmental pollution.

- *High energy battery 6V/4 Ah*
If this time is less than 8 h, you should replace the battery (part 12.026). If the specified typical time of 8 h is not required, the battery has to be changed only if the time less than 5 h, to respect to environmental pollution.

6.7. Pump specifications

Please refer to the user manual for the specifications (*chapter 9*).

6.8. Fault codes and "Ctrl" message

6.8.1. Fault codes

A technical failure will be indicated by the pump with a continuous alarm. During this state, the fault code which causes the pump to fail can be displayed by pressing the "MODE" key. If the pump was switched OFF after a detected failure, the fault code will be stored in the history and also in the configuration of the pump, please refer to *chapter 2.7* (index 380 - 385). Possible fault codes:

| Fault Code | Failure |
|------------|--|
| F_20 | Internal watchdog |
| F_21 | ROM test |
| F_22 | ROM check (Runtime) |
| F_23 | RAM test/check |
| F_24 | XRAM test/check |
| F_25 | CPU test |
| F_26 | Invalid function menu |
| F_27 | EEPROM data invalid |
| F_28 | RTC (real time clock) data invalid, no RTC etc. |
| F_29 | Stepper motor power test (delayed 5s) |
| F_30 | Plunger position calculation failed |
| F_31 | Check for near empty |
| F_32 | 5Volt supply out of range |
| F_33 | 20Volt supply out of range (delayed 5s) |
| F_34 | Pressure reference out of range (LM385 2.5V) |
| F_35 | Pressure signal out of range |
| F_36 | Pressure result invalid |
| F_37 | Pressure sensor test failed |
| F_38 | Barrel diameter signal test failed |
| F_39 | Barrel diameter signal out of range |
| F_40 | Clamp diameter signal out of range |
| F_44 | Address invalid for config-EEPROM |
| F_45 | Address invalid for history-EEPROM |
| F_46 | Frequency from μ C or RTC (real time clock) out of range |
| F_47 | Display-print not present |
| F_48 | Key(s) too long active |
| F_54 | Movement result invalid |
| F_55 | Frequency calculation |
| F_56 | Invalid volume adjustment over time |
| F_57 | Rotation (SW overflow) |
| F_58 | Internal volume control (10/ml) |

We recommend replacing the main board in case a fault code is not included in above list.

6.8.2. "Ctrl" message

If the time of the safety standard check is elapsed, the reminder alarm "Ctrl" will be displayed after power up. The "Ctrl" message also lights up when an invalid serial number is set or a faulty calibration done (pressure & mechanic).



7. REPLACEMENT OF PARTS

7.1. General

CAUTION!

The ARGUS 600 S may only be used with accessories and spare parts which have been approved by ARGUS Medical AG for safe technical use.

CAUTION!

If a new syringe was configured, pressure sensor, complete syringe drive, side wall, housing, main board or power board was replaced, a full calibration is required.

Battery replacing:

After a battery change a safety standard check becomes necessary or at least a visual check of the connections

Disassembly of the housing:

Disconnect the power cord and all interface connections prior to disassembly. Remove pole clamp at the rear side. Remove the 7 screws on the casing base (6 • M4 and 1 • M3), the 2 screws on left side cannot be removed completely. Place the casing cover behind the casing base.

Remove the main board:

Remove the battery connector and all other cables of the main board.

Remove the syringe drive:

Move the drive unit fully right and remove the fixing plate. Unsolder the connecting leads of the strain gauge (DMS) on the power board. Move the drive unit fully left. Disconnect earth cable from side wall, motor cable from main board and flex cable from power board. Remove the syringe drive out from the housing by fully pressed clamp & clutch levers.

Remove the cover drive unit:

Remove the 3 screws on the cover.

Important: To disassemble the unit, open the beaks by hand one third (or put a coin between the beaks) then pull the cover with the levers out of the housing.

Remove the power board:

Important: Replacing the power board requires a new rough alignment of syringe barrel holder diameter, strain gauge and a finale calibration. Unsolder the connecting leads of the strain gauge on the power board. Remove all cables from the board and the 4 fixing screws. Remove the board carefully.

Insert the power board:

Syringe barrel holder must be in the closed position (no syringe inserted). Loosen the lock screw of the cogwheel on the syringe barrel holder potentiometer (R14) axle. Fix the power board with the 4 screws. Make sure the lock screw of potentiometer R14 is accessible from above. Solder the connecting leads of the strain gauge and connect the other cables. Make sure to remove the AC power cord and operate the pump (with open housing) on battery power for rough alignments.



Replace the sidewall (motor):

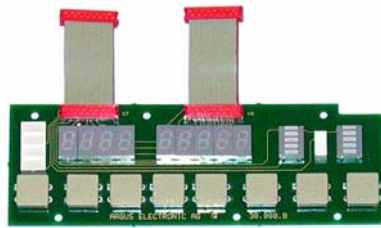
After each disassembly or replacing of the sidewall, the rough alignment of the strain gauge and a final calibration must be executed to guarantee a perfect pump operation and pressure monitoring.

For the part numbers of replacements parts consult the following chapter:

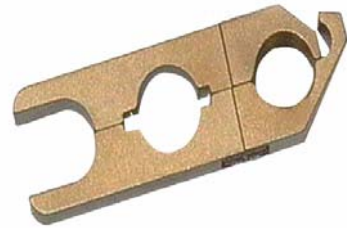
7.2. Spare parts



10.059 Cable staff alert 2m



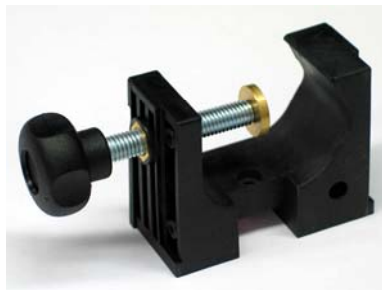
10.061 Display board A600



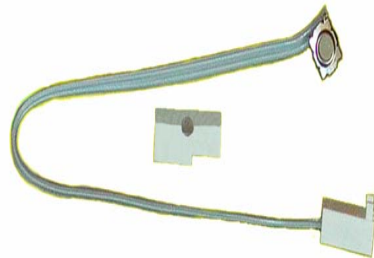
10.066 Spindle nut complete



10.068 Motor and gear



10.087 Combination clamp



10.091 Pushbutton Kit



10.093 Interface cable,
docking & pumps



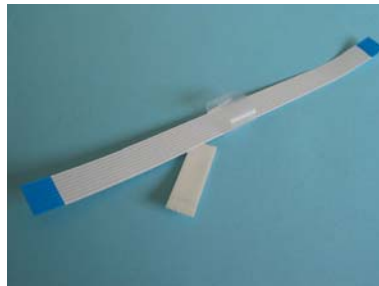
10.131 DC-Plug



10.146 Power board A600 Flash



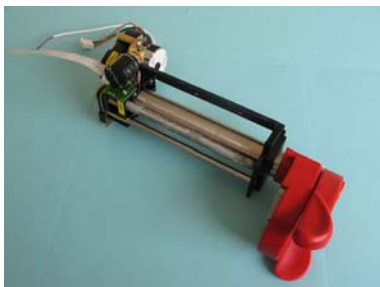
10.147 Mainboard A600 Flash



10.148 Kit Flex cable Flash version



10.149 Casing base Flash version



10.150 Syringe drive complete
Flash version



10.151 Cover drive unit
Flash version



10.152 Housing drive unit
Flash version

REPLACEMENT OF PARTS



10.153 Calibration part 3



10.155 Edge board holder
Flash version



10.157 Driving head complete
Flash version



11.168 Syringe barrel holder



11.170 Side wall motor incl. DMS



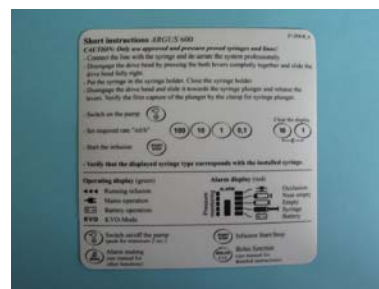
11.188 Syringe guide



11.189 Casing cover



11.194 Calibration part 1



11.199 + 11.201 + 11.225 - 11.232
Short instructions A600
(DE,EN,FR,PT,SW,SP,NL,DK,IT,CZ)



11.200 Identification plate A600



11.213 Front panel A600



11.267 Battery cover 4Ah



11.270 Clamp (top) Flash version



11.271 Clamp (bottom) Flash version



11.272 Cog segment (top)
Flash version

REPLACEMENT OF PARTS



11.273 Cog segment (bottom)
Flash version



11.274 Working lever Flash version



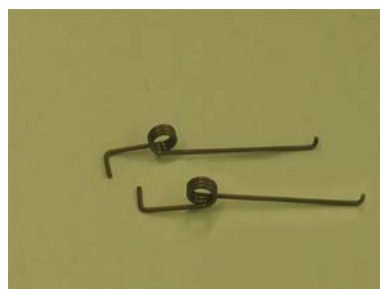
11.275 Beaks lever Flash version



11.276 Spring clamp Flash version



11.277 Casing (driving head)
Flash version



11.278 Torsion spring Flash version



12.026 Battery 6V/4Ah

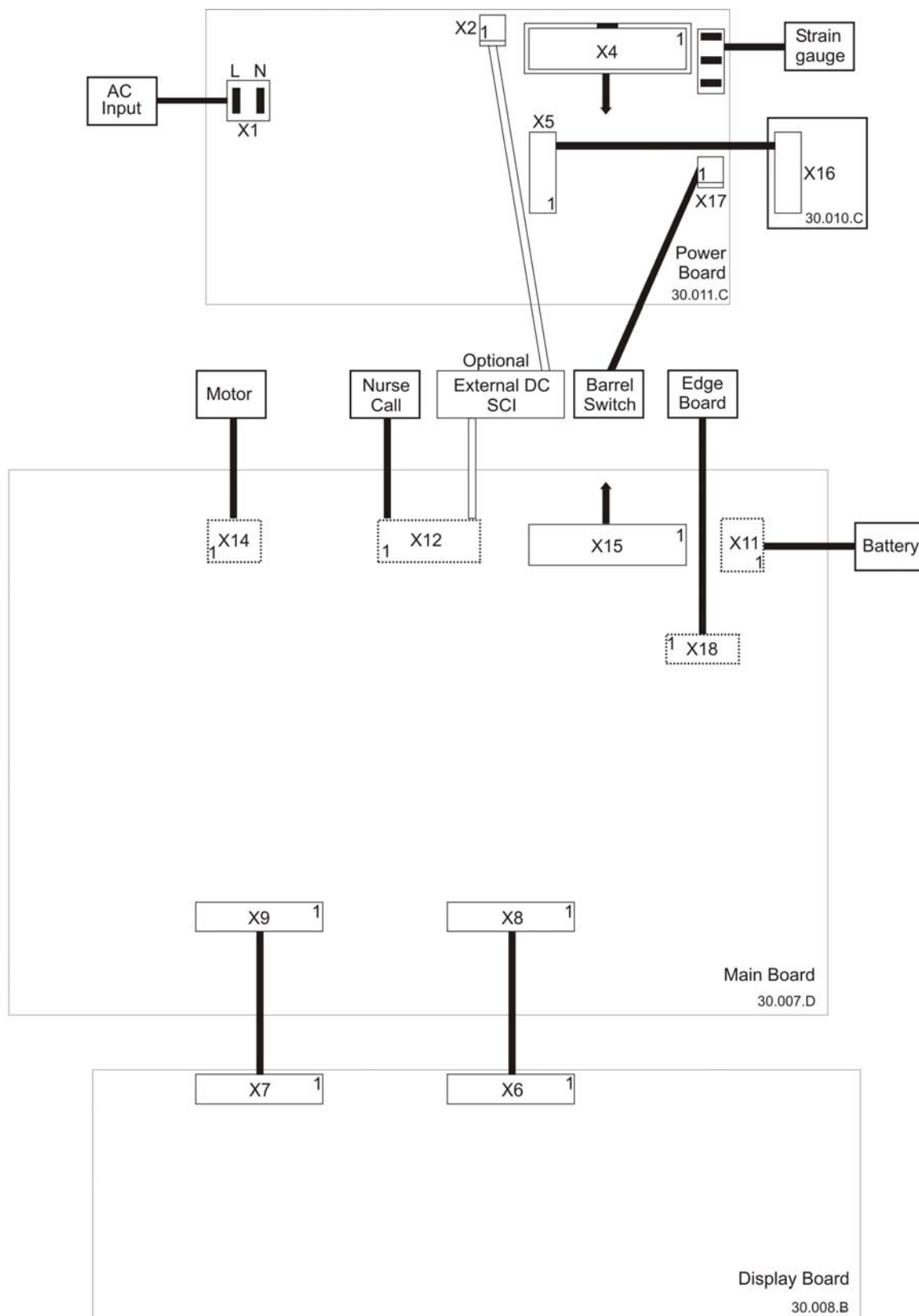


12.032 Battery 6V/1.2Ah

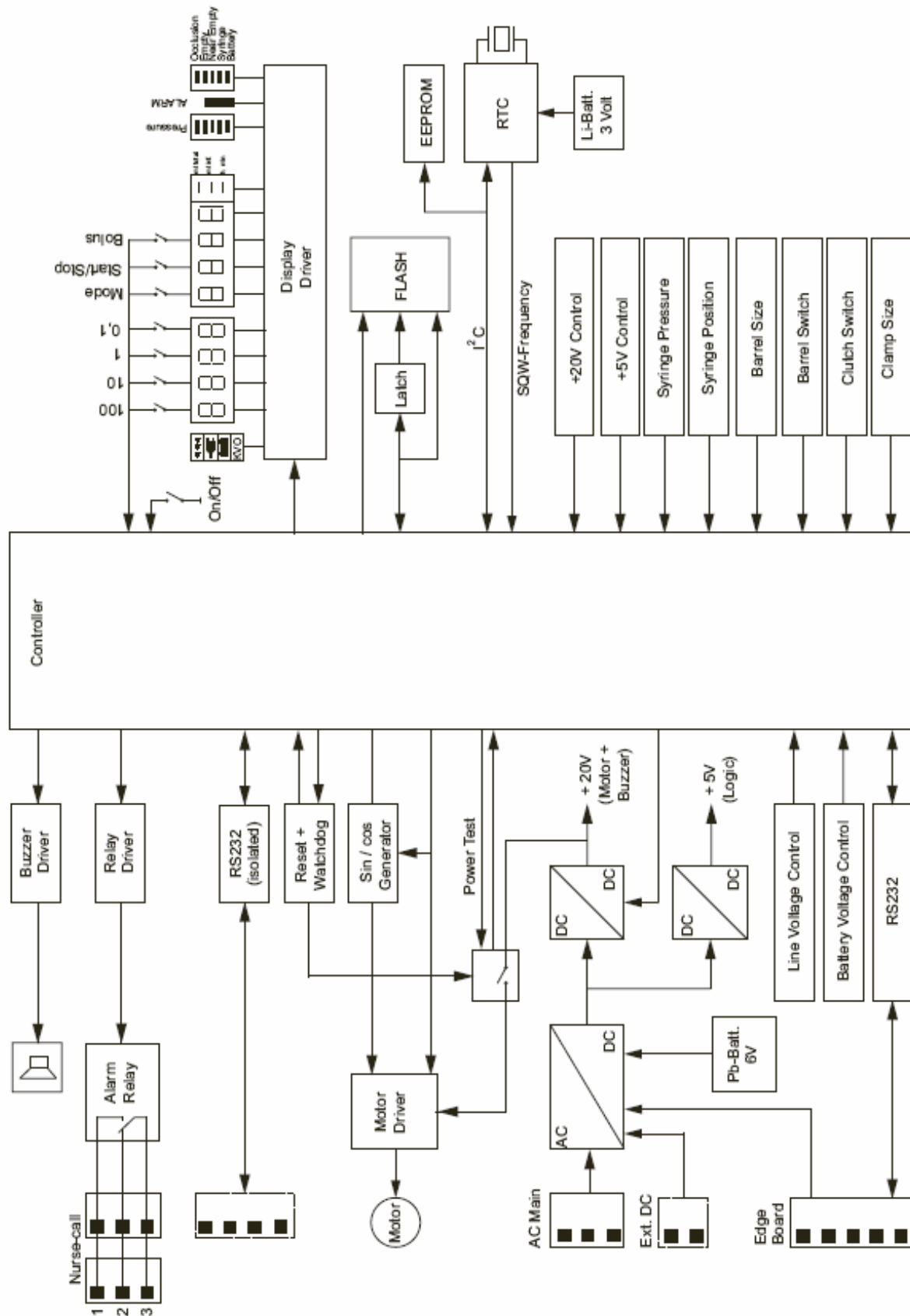


12.035 Pressure gauge with
stopcock (manometer)


8. WIRING DIAGRAMM



9. BLOC SCHEMATIC



10. SAFETY STANDARD CHECK

| Safety Standard Check (SSC) | | ARGUS 600_en | |
|---|---|--|--------------------------|
| Serial-no.: | | Inventory-no.: | |
| Software version: | | Customer: | |
| Hospital: | | Department: | |
| <p><i>The SSC has to be performed at least every 24 months or after 10'000 hours of operation. The check has to be done in accordance to the user- and service manuals.</i></p> | | | |
| 1 | Check if a software upgrade is required | | <input type="checkbox"/> |
| 2 | Visual check for damage, cleanness and completeness. Remove the syringe and ensure that the barrel holder is closed at the end. | - Housing, labels, accessories, connectors, power cable, etc. - Beaks must be fully closed without a syringe inserted | <input type="checkbox"/> |
| 3 | Keep "MODE" key pressed while switching on the pump | - Display of pump type and software release - Display of 2, 4, 7, F., in numeric display - Display of all operation/alarm indicators | <input type="checkbox"/> |
| 4 | Press each key in the following order: "100", "10", "1", "0.1", "MODE", "BOLUS", "START/STOP" | - Every key is acknowledged by a acoustical click, at the end an alarm (buzzer and LED) occurs | <input type="checkbox"/> |
| 5 | Hold the clamp lever in its upper position ① Press the syringe presence switch ② Actuate the clutch lever, release it ③ Release the clamp lever ④ Release the syringe presence switch ⑤ | ① "Syringe" alarm ② No "Syringe" alarm ③ "Syringe" alarm, no "Syringe" alarm ④ "Syringe" alarm ⑤ "Syringe" alarm | <input type="checkbox"/> |
| 6 | Insert a 50 ml syringe and test the pump at its max. rate (999.9 ml/h) | - Running smooth? | <input type="checkbox"/> |
| 7 | Check the occlusion-alarm pressure. See chapter "Pressure control and pump accuracy measurement". | - Pressure increase to ≥ 1.2 bar possible? - Preset level: mbar - Measured level: mbar | <input type="checkbox"/> |
| 8 | Check the pump accuracy. See chapter "Pressure control and pump accuracy ...". | - Preset ml total: 20 ml - Measured volume: ml | <input type="checkbox"/> |
| 9 | Check the external connection "nurse-call" | - Relay contact switches (see chapter "Bloc schematic") | <input type="checkbox"/> |
| 10 | Check the Docking Station interface (if the pump is used in a Docking Station) | - The indicator "external supply" must light on a docked pump | <input type="checkbox"/> |
| 11 | Check time and date | - Get the history entries | <input type="checkbox"/> |
| 12 | Charge the battery min. 16 hours on mains | - The indicator "external supply" must light | <input type="checkbox"/> |
| 13 | Discharge the battery at a rate of 6 ml/h until the pump switches off automatically. Keep "1" key pressed while switching on the pump. Read the infused sum (ml inf.) and multiply it with 10. | - The green indicator "battery" must light while discharging - Running time = ml inf. • 10 = min Reference: 120 min or 480 min | <input type="checkbox"/> |
| 14 | Charge the battery again | | <input type="checkbox"/> |
| 15 | Electrical test according to EN 60601-1 (all measurements made with a power cable 2.5m) | - Visual check of mains connector - Measurements attached | <input type="checkbox"/> |
| <p><i>The pump has passed the SSC and is safe for use</i></p> | | | |
| Date / Name: | | Signature: | |
|  | | | |

11. REPAIR ORDER FORM

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|---|--|---|----------------------------------|---|--|-------------|--|---|-------|---|--------------|--|--|---|--|--|--|--|--|---|--|--|--|--|--|---|--|--|--|
| ARGUS Medical AG / Heimberg Switzerland REPAIR ORDER FORM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Purchase order / Proforma invoice number: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Customer name and address: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Name of contact person: | Tel. number: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table style="width: 100%; border: none;"> <tr> <td style="width: 15%;">Device:</td> <td style="width: 15%;">A414 <input style="width: 40px; height: 15px;" type="text"/></td> <td style="width: 15%;">ARGUS 100 P <input style="width: 40px; height: 15px;" type="text"/></td> <td style="width: 15%;"></td> <td style="width: 15%;"></td> <td style="width: 15%;"></td> </tr> <tr> <td></td> <td>A400 <input style="width: 40px; height: 15px;" type="text"/></td> <td>ARGUS 100 M <input style="width: 40px; height: 15px;" type="text"/></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>A404 <input style="width: 40px; height: 15px;" type="text"/></td> <td>ARGUS 600 S <input style="width: 40px; height: 15px;" type="text"/></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>A200 <input style="width: 40px; height: 15px;" type="text"/></td> <td>ARGUS 707 V <input style="width: 40px; height: 15px;" type="text"/></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>A300 <input style="width: 40px; height: 15px;" type="text"/></td> <td>ARGUS 708 V <input style="width: 40px; height: 15px;" type="text"/></td> <td></td> <td></td> <td></td> </tr> </table> | | Device: | A414 <input style="width: 40px; height: 15px;" type="text"/> | ARGUS 100 P <input style="width: 40px; height: 15px;" type="text"/> | | | | | A400 <input style="width: 40px; height: 15px;" type="text"/> | ARGUS 100 M <input style="width: 40px; height: 15px;" type="text"/> | | | | | A404 <input style="width: 40px; height: 15px;" type="text"/> | ARGUS 600 S <input style="width: 40px; height: 15px;" type="text"/> | | | | | A200 <input style="width: 40px; height: 15px;" type="text"/> | ARGUS 707 V <input style="width: 40px; height: 15px;" type="text"/> | | | | | A300 <input style="width: 40px; height: 15px;" type="text"/> | ARGUS 708 V <input style="width: 40px; height: 15px;" type="text"/> | | | |
| Device: | A414 <input style="width: 40px; height: 15px;" type="text"/> | ARGUS 100 P <input style="width: 40px; height: 15px;" type="text"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | A400 <input style="width: 40px; height: 15px;" type="text"/> | ARGUS 100 M <input style="width: 40px; height: 15px;" type="text"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | A404 <input style="width: 40px; height: 15px;" type="text"/> | ARGUS 600 S <input style="width: 40px; height: 15px;" type="text"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | A200 <input style="width: 40px; height: 15px;" type="text"/> | ARGUS 707 V <input style="width: 40px; height: 15px;" type="text"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | A300 <input style="width: 40px; height: 15px;" type="text"/> | ARGUS 708 V <input style="width: 40px; height: 15px;" type="text"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table style="width: 100%; border: none;"> <tr> <td style="width: 45%;">Accessory:</td> <td style="width: 55%;">Serial Number:</td> </tr> <tr> <td></td> <td>Serial Number / Production code:</td> </tr> </table> | | Accessory: | Serial Number: | | Serial Number / Production code: | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Accessory: | Serial Number: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Serial Number / Production code: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Detailed failure or problem description: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Expected work / repair to be done: <table style="width: 100%; border: none;"> <tr> <td style="width: 15%;">Repair</td> <td style="width: 15%;"><input style="width: 40px; height: 15px;" type="text"/></td> <td style="width: 70%;"></td> </tr> <tr> <td>Warranty repair</td> <td><input style="width: 40px; height: 15px;" type="text"/></td> <td></td> </tr> <tr> <td>Replacement</td> <td><input style="width: 40px; height: 15px;" type="text"/></td> <td></td> </tr> <tr> <td>Other</td> <td><input style="width: 40px; height: 15px;" type="text"/></td> <td>Description:</td> </tr> </table> | | Repair | <input style="width: 40px; height: 15px;" type="text"/> | | Warranty repair | <input style="width: 40px; height: 15px;" type="text"/> | | Replacement | <input style="width: 40px; height: 15px;" type="text"/> | | Other | <input style="width: 40px; height: 15px;" type="text"/> | Description: | | | | | | | | | | | | | | | | | | |
| Repair | <input style="width: 40px; height: 15px;" type="text"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Warranty repair | <input style="width: 40px; height: 15px;" type="text"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Replacement | <input style="width: 40px; height: 15px;" type="text"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other | <input style="width: 40px; height: 15px;" type="text"/> | Description: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table style="width: 100%; border: none;"> <tr> <td style="width: 45%;">Date:</td> <td style="width: 55%;">Signature:</td> </tr> </table> | | Date: | Signature: | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Date: | Signature: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

